

Spring 1-1-2020

## **CMT 452-102: Mechanical and Electrical Systems in Construction**

David Hawes

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# CMT 452 – MECHANICAL AND ELECTRICAL SYSTEMS IN CONSTRUCTION

<b>COURSE NUMBER</b>	CMT 452 - 102
<b>COURSE DESCRIPTION</b>	Mechanical and Electrical Systems in Construction
<b>COURSE STRUCTURE</b>	(3-0-3) (lecture hr/wk - lab hr/wk – course credits)
<b>COURSE DESCRIPTION</b>	Study of the different types of water supply, plumbing, fire protection, heating, ventilation, air conditioning and electrical systems commonly employed in residential and commercial buildings. Case studies and design of these systems and their installation in the field.
<b>PREREQUISITE(S)</b>	None
<b>COREQUISITE(S)</b>	None
<b>REQUIRED MATERIALS</b>	Mechanical and Electrical Systems in Buildings, 5/E ISBN# 9780138015626 (Book has a picture of a boiler on it.)
<b>NATURE OF COURSE</b>	Elective
<b>COMPUTER USAGE</b>	Word, Excel, Primavera, MS Project, MS Power Point
<b>COURSE LEARNING OUTCOMES</b>	By the end of the course students should be able to: <ol style="list-style-type: none"><li>1. Understand and apply the proper design calculations for heating and cooling systems, fire suppression systems, sanitary systems, domestic water systems, and all types of electrical systems found in residential and commercial structures.</li><li>2. Be able to understand and calculate the cost benefit analysis of integrating more efficient mechanical and electrical systems into buildings.</li><li>3. Be able to recognize areas of high energy loss, and recommend remediation solutions.</li><li>4. Be familiar with the following codes, ASHRAE, NFPA, NEC and NPC.</li></ol>
<b>CLASS TOPICS</b>	Basic principles of electrical, mechanical systems, water systems, fire protection systems, air conditioning systems and heating systems.
<b>STUDENT OUTCOMES</b>	The Course Learning Outcomes support the achievement of the following TAC of ABET Criterion 9 requirements  <b>Student Outcome a</b> - an ability to select and apply the knowledge, techniques, skills, and modern tools of their disciplines to broadly-defined engineering technology activities; <b>Course Learning Outcome</b> – Understand and utilize various codes to solve MEP design problems, including the use of computer based software.  <b>Student Outcome b</b> - an ability to select and apply a knowledge of mathematics, science, engineering, and technology to engineering technology problems that require the application of principles and applied procedures or methodologies <b>Course Learning Outcome</b> - Select the best and most economical (energy efficiency to be taken into account) MEP system the fits the demand for the structure.

**Student Outcome d** - An ability to design systems, components or processes for broadly-defined engineering technology problems appropriate to program educational objectives;

**Course Learning Outcome-** Design a heating and cooling system, domestic plumbing, sanitary, and electrical systems for a commercial

**Student Outcome f** - an ability to identify, analyze, and solve broadly-defined engineering technology problems;

**Course Learning Outcome** – Identify the best MEP design for various buildings applying a cost benefit analysis for effect and the long term effects of the price of energy to calculate the total costs.

**Student Outcome g** - an ability to communicate effectively regarding broadly-defined engineering technology activities;

**Course Learning Outcome** - Presentation of calculations and drawings in a professional manner.

**Student Outcome g** - An ability to apply written, oral, and graphical communication in both technical and non-technical environments; and an ability to identify and use appropriate technical literature;

**Course Learning Outcome** - Students will be required to research various technical topics utilizing appropriate technical literature and present a given topic to the class in a peer review setting.

**Student Outcome k** – A commitment to quality, timeliness and continuous improvement;

**Course Learning Outcome** - Students will complete on time and present materials in a professional manner.

**Student Outcome l** – Producing and utilizing design, construction and operations documents;

**Course Learning Outcome** - Students will properly design MEP systems based on ASHRAE, NFPA, and NPC requirements, as well as read construction documents for constructability.

**Student Outcome n** – Selecting appropriate construction materials and practices

**Course Learning Outcome** - Selection of proper duct, wire and wire type, pipe and pipe type for MEP systems.

**Student Outcome p** - Applying basic technical concepts to the solution of construction problems involving hydraulics and hydrology, geotechnics, structures, construction scheduling and management and construction safety; Specifically for this course.

**Course Learning Outcome** – Employ the ASHRAE, NFPA and NPC codes to solve problems in mechanical and electrical systems.

**Student Outcome q** – - Performing standard analysis and design in at least one technical specialty within construction engineering technology that is appropriate to the goals of the program;

**Course Learning Outcome** - Employ the ASHRAE, NFPA and NPC codes to solve problems in mechanical and electrical systems.

## **GRADING POLICY**

Homework / Assignments	10 %
Test(s)	20 %
Final Exam	35 %
Term Project	10%
Quiz	25%

**Note:** A student cannot pass this course if:

1. You having failing grades on the tests and final exam.
2. You have not taken all tests and the final exam.

**ACADEMIC INTEGRITY**

NJIT has a zero-tolerance policy regarding cheating of any kind and student behavior that is disruptive to a learning environment. Any incidents will be immediately reported to the Dean of Students. In the cases the Honor Code violations are detected, the punishments range from a minimum of failure in the course plus disciplinary probation up to expulsion from NJIT with notations on students' permanent record. Avoid situations where honorable behavior could be misinterpreted. For more information on the honor code, go to <http://www5.njit.edu/middlestates/sites/middlestates/files/lcms/docs/2012/academic-integrity-code.pdf>

**STUDENT BEHAVIOR**

- No eating or drinking is allowed at the lectures, recitation and workshops.
- Cellular phones must be turned off during the class hours – if you are expecting an emergency call, leave it on vibrate.
- No headphones can be worn in class.
- Unless the professor allows the use during lecture, laptops should be closed during lecture.
- Class time should be participative. You should try to be part of a discussion

**MODIFICATION TO COURSE**

The Course Outline may be modified at the discretion of the instructor or in the event of extenuating circumstances. Students will be notified in class of any changes to the Course outline.

**PREPARED BY**

David M. Hawes

**COURSE COORDINATED BY**

Prof. John A. Wiggins

**CLASS HOURS**

Tuesdays          6:00 PM – 09:05 PM          GITC 1100

**OFFICE HOURS**

The Instructor will be available 30 minutes before and after class. He does not have an official office however other arrangements can be made which would accommodate both parties. He is on campus multiple times a week. Please e-mail to request and coordinate at [David.Hawes@njit.edu](mailto:David.Hawes@njit.edu)

**Tentative Schedule (Subject to change)**

<b>Week</b>	<b>Date</b>	<b>Topic</b>	<b>Readings</b>	<b>Assignments</b>
1.		Course Overview – Intro and Chapter 1	Chapters 1-2-3	
2.		Chapter 2 and 3	Chapter 4	
3.		Chapter 4	Chapter 5	
4.		Chapter 5	Chapter 6	Test #1
5.		Chapter 6	Chapter 7-8	
6.		Chapter 7 and 8	Chapter 9	
7.		Chapter 9	Chapters 10-11	Test #2
8.		Chapter 10 and 11	Chapters 12-13	
9.		Chapter 12 and 13	Chapters 14-15	
10.		Chapter 14 and 15	Chapter 16	Test #3
11.		Chapter 16	Chapter 17	
12.		Chapter 17	Chapter 18	
13.		Chapter 18	Chapter 19	
14.		Chapter 19 / Review		
15.		Review / term projects		