

# **Mechanics Institute**

*An Educational Program of  
The General Society of Mechanics & Tradesmen*

## **Course Catalog 2017**



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New York, NY 10036  
212.840.1840  
[www.generalsociety.org](http://www.generalsociety.org)**

**OFFICERS OF  
THE GENERAL SOCIETY OF MECHANICS & TRADESMEN**

THE MECHANICS INSTITUTE WAS FOUNDED IN 1858 BY THE GENERAL SOCIETY OF MECHANICS & TRADESMEN OF THE CITY OF NEW YORK. THE OFFICERS OF THE GENERAL SOCIETY FOR THE YEAR 2017 ARE:

**GERARD DROHAN, JR., PRESIDENT  
GERARD A. DENGEL, VICE PRESIDENT  
NILI OLAY, TREASURER  
GOTTFRIED WEISSGERBER, SECRETARY**

MECHANICS INSTITUTE'S SCHOOL COMMITTEE IS COMPRISED OF ONE CHAIRPERSON AND SELECTED MEMBERS OF THE GENERAL SOCIETY OF MECHANICS & TRADESMEN. THE SCHOOL COMMITTEE MEETS TEN TIMES PER YEAR TO REVIEW SCHOOL OPERATIONS, FORMULATE POLICY, DETERMINE BUDGETS, AND PROVIDE DIRECTION. THE MEMBERS OF THE SCHOOL COMMITTEE'S FOR THE YEAR 2017 ARE:

**MECHANICS INSTITUTE  
SCHOOL COMMITTEE CHAIR DAN HOLOHAN**

**GERARD DROHAN, JR., P.P.  
VICTORIA A. DENGEL, P.P.  
ELLEN FISCH  
JOHN L. FLYNN  
ALEX MARX  
BRIAN MCAULIFFE  
ANDREW SCHON  
GOTTFRIED WEISSGERBER, P.P.**

**EXECUTIVE DIRECTOR VICTORIA A. DENGEL, P.P.  
REGISTRAR & PROGRAM COORDINATOR LISA WOLF**

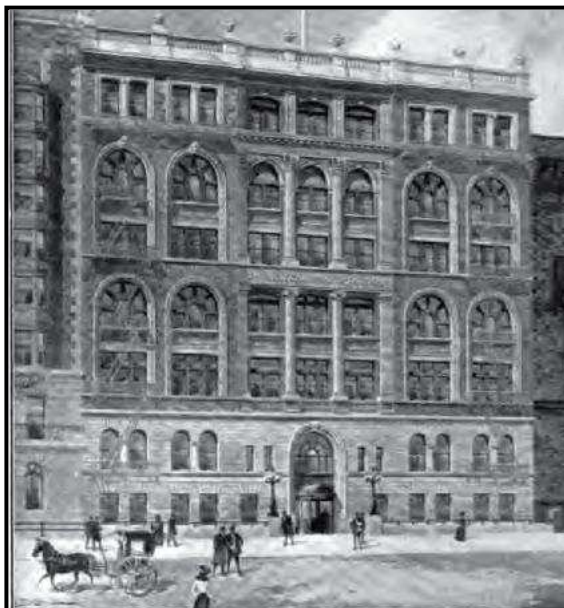
## MECHANICS INSTITUTE

*It is obvious from the leather bound certificates on display and the number of students milling about the stair well that this is a Mechanics Institute in the traditional sense – a place of learning for trades people.*

~ Cathy Milward-Bason

**A Great Tradition:** The Mechanics Institute of New York City  
*Australian researcher of existing Mechanics Institute still in operation*

Among the many resplendent flags unfurling in the midtown Manhattan breeze is the gold and royal blue emblem of the General Society of Mechanics & Tradesmen. Beneath that flag, which flies above 20 West 44<sup>th</sup> Street, is the entrance to the stately landmark building that has been the General Society's historic home for over a century. Housed within the oak and marble walls, beneath the subdued glow of polished antique lamps, is New York City's oldest technical school – the **Mechanics Institute**.



### A Proud Tradition of Training Working Adults

The **General Society of Mechanics & Tradesmen of the City of New York** was founded on November 17, 1785, by twenty-two skilled tradesmen and



craftsmen who gathered in Walter Heyer's public-house on Pine Street in lower Manhattan. The aims of the General Society were to provide cultural, educational, and social services to families of skilled craftsmen. During this early period, The General Society celebrated the mutuality and centrality of the craft community. Apart from its charitable activities, the Society played a prominent role in

the festivities that marked patriotic holidays, carrying banners emblazoned with its slogan “*By Hammer and Hand all Arts do Stand.*”

In 1820, The General Society opened one of the city's first schools that was free to members. There was no public school system in New York at the time, and only two other free schools were to be found in the entire city – one in the almshouse, and the other open only to the children of freed slaves. Our school opened with seventy students. Children of members were admitted free of charge, and a small fee was required from all others. (Later that same year the Society added a separate school for girls.) The school, which became the Mechanics Institute in 1858, continues to provide tuition-free evening instruction in trades-related education.

In 1858, after the New York City public school system had been sufficiently developed and daytime instruction became widely available, The General Society elected to convert its school into a Mechanics Institute that would provide training to those citizens whose work obligations prevented their pursuit of a formal technical education.

Historically, Mechanics Institutes were educational establishments formed to provide adult education, particularly in technical subjects, to working men and, later, women. As such, they were often funded by local industrialists on the grounds that they would ultimately benefit from having more knowledgeable and skilled employees. The Mechanics Institutes also served as “libraries” for the adult working class.



The first Mechanics Institute was incorporated in Glasgow in November 1823, founded on work begun at the turn of the previous century by George Birkbeck. Through the auspices of the Andersonian University, Birkbeck first offered free lectures on arts, science, and technical subjects in 1800.

This Mechanics Class continued to

meet after he moved to London in 1804, and in 1823 they decided to formalize their organization by incorporating themselves as the **Mechanics Institute**. The London Mechanics Institute (later Birkbeck College) followed in December 1823, and by the mid-19th century, there were over 700 institutes in towns and cities across the UK, the United States, and Australia, some of which became the early roots of other colleges and universities.

Small tradesmen and workers could not afford subscription libraries, so benevolent groups and individuals created "Mechanics Institutes" that contained inspirational and vocational reading matter, for a small rental fee. Later, popular non-fiction and fiction books were added to these collections. Beyond lending books, Mechanics Institutes, also provided lecture courses, laboratories, and in some cases contained a museum for the members' entertainment and education.

Our new Mechanics Institute's focus was revised to provide "*privately-endowed free evening instruction to respectable young men and women to improve themselves in their daily vocations,*" and to assist those who were obliged to become wage earners before completing their desired education.

Many of the Institute's early alumni, such as Andrew H. Dykes of Dykes Lumber, Harry S. Weller of the L.J. Wing Manufacturing Co., and Andrew G. Hagstrom, of the Hagstrom Map Company, became renowned and respected members of industry and society.

Between 1898 and 1903, Andrew Carnegie, a member, contributed over half a million dollars to The General Society. Generous gifts to create our present school came in from other members as well, and by 1913 enrollment at Mechanics Institute had reached 2,300.



Today, The General Society is located at 20 West 44th Street, across from the Harvard Club of New York, and is listed on the National Register of Historic Places.

## Institutional Philosophy

The Mechanics Institute is firmly committed to the belief that by optimizing students' skills in their respective trades, we provide a tangible benefit to the students and their employers and enhance their roles as productive members of society.

Instructors at Mechanics Institute are inspired to teach out of personal pride in their trades and a sincere desire to pass on their experience and knowledge to others. It is for this reason that our Mechanics Institute has long been recognized as a traditional meeting ground where motivated men and women can develop and enhance their abilities under the guidance of accomplished instructors who work in the field.

In achieving these goals, we gain the satisfaction of helping fill the critical needs of those who directly and indirectly reap the rewards of our programs — the graduates, industry, and New York City, of which we are all a part.

### Mission Statement

**Mechanics Institute's** historic existence is founded on the belief that education is the key to life's success. Our steadfast conviction is built on our commitment to help those who are willing to help themselves. To this end, we are dedicated to:

- *preparing the foundation for those willing to rise;*
- *providing the ladder for those willing to climb; and*
- *fueling the spirits of those willing to soar.*

### Statement of Ownership

Mechanics Institute is a tuition-free coeducational evening technical program founded and supported by The General Society of Mechanics & Tradesmen of the City of New York. The program was established in 1858 to provide instruction in technical trades to qualified individuals who would benefit from learning skills that lead to gainful employment.

## MECHANICS INSTITUTE TODAY

The Mechanics Institute offers tuition-free instruction to individuals who are currently employed in industries related to the disciplines we offer. The Institute provides such qualified individuals with the technical knowledge necessary to advance in their chosen fields. While Mechanics Institute is not a trade school, it does offer comprehensive instruction in a wide variety of subject areas related to the building and construction industry and has trained more skilled workers than any other institution in the nation.

A multi-tiered curriculum effectively establishes Mechanics Institute as a unique educational program.

- The *technical programs* offer construction programs, which are expanded and updated on an ongoing basis.
- The *professional school* offers programs for tradespeople, business owners, general contractors, and construction managers in areas relevant to growing and enhancing their small businesses.
- The *school of continuing education* offers stand-alone courses and short-term programs to individuals seeking personal development.

### General Facilities and Equipment

When you first visit the Mechanics Institute, your attention is immediately drawn to the building's landmark façade, which was built in 1891 and has been well-preserved over the years. Entering the building, you find yourself facing our Library's oak, brass, and glass doors.

To the right is an elevator, which provides visitors with access to the building's six floors. To the left is a sweeping marble staircase, fitted with polished brass handrails and amber-shaded lamps.

The school's administrative offices are located on the first floor, which also houses one computer lab and four drafting classrooms. The fourth floor has two lecture classrooms, one lecture hall, and a faculty lounge.

## ADMISSIONS POLICIES

*...the main consideration should be to help those who will help themselves; to provide part of the means by which those who desire to improve may do so; to give those who desire to rise the aids by which they may rise; to assist, but rarely or never to do it all. Neither the individual nor the race is improved by alms giving...*

~Andrew Carnegie  
Benefactor of the Mechanics Institute

### Entrance Requirements

Mechanics Institute offers tuition-free technical programs in the following building and construction trades:

**Electrical Technology**

**Plumbing Systems**

**Construction Project Management**

**HVAC/R Systems**

**AutoCAD and BIM**

Applicants may only enroll in the program that is most related to their current, or recent, field of employment. While two programs may not be taken concurrently, a student who has completed one program may subsequently enroll in another program unrelated to his/her current field.

To qualify for admission, applicants must present the following items:

- college transcript, high school diploma, or GED
- letter of employment describing the nature of their work
- Photo ID

In addition to the above items, applicants must

- possess a working knowledge of English
- submit a formal Letter of Application to the school
- submit their registration fee at the time they register



### **Credit for Prior Instruction**

To satisfy the graduation standards in their respective programs, students should take the required core and elective courses in the sequence prescribed. Credit toward Mechanics Institute's certificate of completion is only awarded for instruction received at the Institute. Because of the specific course content of our programs, credit cannot be awarded for training acquired at other institutions.

### **Returning Students**

**Mechanics Institute** provides updates on its policies, procedures, and requirements with each new edition of the catalog. For this reason, returning students are encouraged to carefully review the most current catalog and become familiar with changes that may be in effect.

*Alumni* are welcome to return to the Institute to pursue other disciplines. Alumni returning for continuing education may take AutoCAD, mathematics, or elective courses from within the various disciplines we offer. Alumni returning to enroll in a comprehensive program *must* take their courses in the *sequence* prescribed by that program.

*Former students* who did not graduate but who wish to continue instruction after an extended leave *not exceeding four (4) years* must begin as new students, unless they are within one hundred (100) hours of program completion.

## **REGISTRATION AND MEMBERSHIP FEES**

### **Registration Fee**

The registration fee is \$100 per semester. Please note that the registration fee is non-refundable once your courses have been scheduled.

### **Annual Membership Fee**

The annual membership fee, which qualifies the applicant for enrollment in Mechanics Institute's courses and programs, is \$75.

Note: All fees are due at the time of registration.

## INSTITUTIONAL STANDARDS

### **Attendance**

Students are required to be in their assigned classrooms at the start of class and remain until the end of the session. Attendance is taken by instructors and collected by the Registrar during the first half-hour of each class session. Absences are excused only in case of emergencies. Repeated absences will result in termination.

### **Lateness**

A grace period of fifteen (15) minutes is permitted after the start of class. Students arriving to class after the first 15 minutes will be marked late. Chronic lateness will come under review by the instructor and the Director.

### **Breaks**

At their discretion, instructors may provide students with a break at the midpoint of the session. Breaks do not exceed ten minutes in duration, nor are they waived as an option for early dismissal.

### **Make-Up Hours**

Make-up requirements will be determined and assigned by the individual instructor and approved by the Director.

### **Dress Code**

Students are expected to wear appropriate attire at all times.

### **Exams, Tests, Quizzes, and Assignments**

Written exams, tests, quizzes, and/or assignments are given throughout the semester in addition to the final exam. Frequent testing allows instructors to consistently assess student progress and in turn communicates this to students.

### **Make-Up Exams**

A student who for reasonable cause has to miss a final exam must formally notify the instructor in advance of the scheduled exam date. The student will then be informed of an alternate exam date for a make-up final. A student who fails to take either the original or the make-up final will be given a 0%.

### **Exam Scheduling and Final Grade Disclosure**

Instructors will inform students of their final exam date at least two weeks in advance of the date. The final exam date must be at least one session earlier than the final day of classes. The final day of classes is reserved for review of the final exam (or assignment.) Instructors must also inform students of their final grade for the course on the final class day and obtain signatures from students confirming disclosure.

### **School Lockers**

There are a limited number of lockers that are available to students. Lockers are reserved for students in courses that produce art or drafting projects and the locker selected must correspond to the room where the student attends class. Lockers must be emptied and left in clean condition by the last scheduled day of class. Mechanics Institute cannot accept responsibility for loss of personal items.

### **Assigned Textbooks**

At the start of each semester instructors will inform students regarding the textbook that is used for the course. Students must make every effort to immediately obtain the course textbook.

### **Grade Equivalents**

95 – 100 .....	Excellent
85 – 94 .....	Very Good
75 – 84 .....	Good
70 – 74 .....	Passing
Below 70 .....	Failing

### **Grade Weightings**

All written exams, tests, quizzes, and/or student assignments must be completed in a timely manner. All final grades should be reported by instructors to students and submitted to the registrar on the last day of the semester.

<i>Written Exams, Quizzes or Assignments</i> .....	60%
<i>Punctuality, Attentiveness, Classroom Participation</i> .....	10%
<i>Final Exam</i> .....	30%

### **Grade Disputes**

Instructors must provide all students with a syllabus outline at the beginning of the course. If a student believes there exists justification to dispute a grade, he or she must do so within one week of the grade's posting. To do this, the student must meet with the Registrar, who will then arrange a conference with the Director, the student, and the instructor whose grade is disputed.

### **Course or Schedule Adjustment**

When feasible, changes in courses or schedules may be permitted through the first two weeks of the semester

### **Course Withdrawal**

A student wishing to drop a course must formally notify the School within the first three weeks of the semester by completing a Withdrawal Request Form. Such students are considered to have officially withdrawn and may return and re-enroll in the course in a future semester.

### **Course Drops**

A student who withdraws after the third week of the semester, or who stops attending without formally withdrawing from classes, will be considered to have dropped the course. Any student who withdraws or drops from a course twice in two semesters will be ineligible for readmission into the program.

## ACADEMIC CALENDAR

Mechanics Institute's academic year consists of a fall and a spring semester, with a break between the Christmas and New Year holidays. Each semester is thirteen (13) weeks in duration. The fall semester begins the first Monday after Labor Day and ends around the second week in December. The spring semester begins the third Monday after New Year's Day and ends around the third week in April.

Since the exact starting and ending dates of each semester will vary from year to year, applicants should speak with an Institute administrator. Enrollment applications are not accepted after the final date of registration, and no late registration will take place after the start of the new semester.

### **Mechanics Institute's Hours of Operation**

The Mechanics Institute hours of operation are Monday through Friday from 11:00 a.m. to 7:00 pm.

### **Class Schedules**

To accommodate the student work schedules, instruction is conducted throughout four different evening sessions. Each session meets for two hours per evening, two days per week, for a total of thirteen (13) weeks as indicated below:

Monday and Wednesday from 5:30 pm to 7:00 pm, and 7:00 pm to 8:30 pm. Tuesday and Thursday from 5:30 pm to 7:00 pm, and 7:00 pm to 8:30 pm.

## **Holidays Observed**

Mechanics Institute is closed during the following holidays on the dates they are officially observed during the Academic Year:

<i>New Year's Day</i>	<i>Martin Luther King Day</i>	<i>Presidents' Day</i>
<i>Good Friday</i>	<i>Memorial Day</i>	<i>Independence Day</i>
<i>Labor Day</i>	<i>Columbus Day</i>	<i>Veterans Day</i>
<i>Thanksgiving Day</i>	<i>Christmas Day</i>	

## **Official Transcripts**

Transcripts listing a student's courses and grades, and bearing the seal of Mechanics Institute, are issued to employers, potential employers, and other educational / instructional institutions. Transcripts must be requested on business letterhead and accompanied by a signed release from the student or graduate.

Alternatively, students or graduates may complete and sign a Transcript Request Form available from the registrar, and provide the name and address of third party (business or school) to whom the transcript should be sent. Transcripts are not provided to students, nor to third parties lacking the student's signed release.

## **Student Identification Cards**

Identification cards are provided to students at the start of each semester and are valid only for the semester in which they are issued. The ID cards must be presented in order to enter the Institute's premises. Students who lose or forget their ID cards must see the registrar to have them replaced in order to be allowed access to the classrooms.

## **STANDARDS OF CONDUCT**

It is the policy of the Mechanics Institute to maintain a professional environment and a workplace that is free from harassment or intimidation of either a verbal or physical nature. This is not limited to sexual harassment, but includes any harassment based on age, race, national origin, color, handicap, sexual preference, or religion.

Administrative staff, faculty, and students have the responsibility for adhering to acceptable standards of personal behavior and for ensuring that others have the opportunity to carry out their work and assignments in a professional atmosphere.

### **Drug Awareness/Substance Abuse Policy**

In compliance with the Drug-Free Schools and Communities Amendment Act of 1989 (Public Law 101-226,) Mechanics Institute, as a matter of policy, prohibits the manufacture and unlawful possession, use, or distribution of illicit drugs and alcohol by students on its property and at any school activity. Any violation of this policy will result in appropriate disciplinary actions, up to and including termination of enrollment. Where it is apparent that a violation of law has occurred, the appropriate law enforcement authorities will be notified.

### **Cell Phones**

Students are required to turn off their cell phones during class.

## **Termination of Enrollment**

Mechanics Institute reserves the right to immediately terminate the enrollment of any student for any of the following, or similar, actions:

- ☑ *Threatening another student, an instructor, or other employee of the Mechanics Institute*
- ☑ *Cheating, stealing, plagiarizing, or similar fraudulent behavior*
- ☑ *Disrespectful, abusive, and disruptive behavior*
- ☑ *Defacing or damaging Institute property or equipment*
- ☑ *Using cell phones anywhere on the Institute premises*
- ☑ *Eating anywhere on the Institute premises*
- ☑ *Failing to comply with Institute policies or directives as communicated by administrative or instructional staff.*

## **Course Schedules**

Mechanics Institute makes every effort to schedule courses in program sequence. At its discretion, and when necessary a course may be canceled.

## **Certificate of Completion**

The Mechanics Institute certificate of completion is an optional professional credential awarded to students who successfully complete the courses required by the program in which they are enrolled. The certificate has no degree equivalence and is not necessarily recognized by other degree-granting institutions.

## **Policies and Procedures**

At its discretion, Mechanics Institute reserves the right to review these policies and procedures and modify them as it deems necessary.



## **Commencement Exercises**

Commencement exercises celebrating the motivations, efforts, and accomplishments of our graduates are held within the traditional and historic setting at The General Society Library, located on the ground floor of the building.

### **Eligibility for Graduation**

Students are eligible for graduation when they have successfully:

- completed the attendance requirements of the program**
- completed the course requirements of the program**
- maintained a final grade of 70% or better in all courses, and**
- satisfied all financial obligations to the Institute, including payment of the graduation fee.**

Institute policies prevent the issuing of transcripts, report cards, and/or certificates of completion to any student who has not fully satisfied all financial obligations, or who owes homework, assignments, books, or other materials to the Mechanics Institute or General Society. There is a \$100 graduation fee to cover the costs associated with documenting records, grades, and certificates. Once all graduation requirements are met, the student will be eligible to receive his/her certificate of completion.

## **Awards and Scholarships**

Since 1882 the Society has maintained scholarships for the benefit of students of Mechanics Institute. Among these are:

The **George E. Hoe** medal and scholarship, funded by this past president of the Society, are awarded to graduates who have demonstrated significant achievement during their enrollment at Mechanics Institute.

The **Albert A. Cuneo Scholarship Fund** is awarded to graduates who demonstrate excellence in their work and diligence in their attendance throughout their years of study at Mechanics Institute. This award provides funding for a course of study at a school of the student's choosing.

The **Thomas S. DeNapoli Award**, sponsored by KND Licensed Electrical Contracting & Services Corp., is presented to one outstanding graduate from the Electrical Technology program.

The **MBA Scholarship Awards**, sponsored by the Mortgage Bankers Association of New York, is presented to one outstanding student from each program.

The **Alan Senzer Award**, sponsored by Alan Senzer, is presented to one outstanding graduate from the Construction Project Management program.

**Technical Book Awards**, funded by **Leon F. Munier** and **Frank E. Cass**, are presented to deserving HVAC and Plumbing graduates respectively.

The **American Society of Sanitary Engineering** also funds an annual award to one outstanding graduate from the Plumbing Technology program.

The **Penguin, an EMCOR Company, Achievement Award** for excellence in HVAC/R.

# EDUCATIONAL PROGRAMS



**M**echanics Institute offers tuition-free instruction to individuals who are employed in the building and construction trades and provides them with the technical knowledge necessary to advance in their respective fields. While Mechanics Institute is not a trade school, it does offer comprehensive instruction in a wide variety of subject areas related to the building and construction industry.

A multi-tiered curriculum effectively establishes Mechanics Institute as a unique educational facility where the learning needs of every applicant can be satisfied, if not in whole, at least in part. The **Electrical Technology**, **HVAC/R Systems**, and **Plumbing Systems** disciplines that comprise our **technical programs** are expanded and updated on an ongoing basis to ensure their viability and real-world relevance of our program offerings.

# ELECTRICAL TECHNOLOGY PROGRAM

The **Electrical Technology** program is a two-year discipline designed to provide students with a practical understanding of electrical work as it applies to the field of construction. The core courses for the first year of the program focus on Direct Current circuits, where students revisit the rudiments of electrical theory, including Kirchoff's Law, Ohm's Law, and the technical mathematics required for electrical design.

Subsequent courses provide a thorough exposure to alternating circuit theory, electrical motors, electronics, and cost estimating. The program is rounded out with rigorous course work in commercial and industrial wiring. Throughout the program, students are able to "personalize" their instruction by choosing elective courses that they find relevant to their current employment and future career objectives.

## Who should enroll in the Electrical Technology program?

Individuals employed as electrician's helpers, as well as those working in any of the diverse fields that rely on an integral understanding of electricity. Those working in these areas in a managerial or supervisory capacity will also benefit from the thorough understanding of electrical code and compliance issues provided by this program.

***Please note: The chart below represents a sample course sequence and may not reflect the order in which actual courses are completed.***

<b>Year</b>	<b>Semester</b>	<b>Code</b>	<b>Course Name</b>
First	First	<b>MA TEC</b>	<b>Technical Mathematics</b>
		<b>EL 101</b>	<b>Introduction to the National Electric Code</b>
First	Second	<b>EL 201</b>	<b>Electricity for the Trades 1 - DC Circuit Analysis</b>
		<b>EL 203</b>	<b>Electrical Print Reading &amp; Troubleshooting</b>
Second	First	<b>EL 202</b>	<b>Electricity for the Trades 2 - AC Circuit Analysis</b>
		<b>EL 301</b>	<b>Residential Wiring</b>
Second	Second	<b>EL 302</b>	<b>Commercial &amp; Industrial Wiring</b>
		<b>EL 303</b>	<b>Electric Motors &amp; Motor Controls</b>

### **MA TEC Technical Mathematics**

This course includes an electrical math review which covers: SI units, engineering notation and prefixes, unit conversion, percentages, area and volume, ratio and proportion, the right triangle (including sine, cosine, tangent, and arc tangent), and formula manipulation.

### **EL 101 Introduction to the National Electric Code**

This is an introductory course on the use and interpretation of the National Electric Code (NEC). Students will learn the purpose and history of the code ; develop a working knowledge of the code requirements for wiring, overcurrent protection, materials and equipment; and be able to discern between wiring methods used in different occupancies, special occupancies, special equipment, special conditions and communication systems, and be able to use the NEC tables to size conduit raceways.

### **EL 201 Electricity for the Trades 1 - DC Circuit Analysis**

#### **Prerequisites: Technical Math**

This is an introductory course for students in the electrical trade. The objective is for students to understand and perform circuit analysis on Direct Current (D.C.) circuits. The course will instruct the students on the basics of Direct Current (DC circuit) and covers definitions of conductors and insulators, current, voltage, resistance (R) and resistive circuits, power, work/energy, capacity factor, and efficiency. The course includes analysis of series, parallel, and series/parallel DC circuits using Ohm's Law and Kirchoff's Laws, Source Conversions, Superposition, and Thevenin's and Norton's theorems and equivalent circuits.

### **EL 203 Electrical Print Reading & Troubleshooting**

#### **Prerequisites: Technical Math, and Intro. to the NEC**

Students are will learn the fundamentals of electrical print reading to include single line diagrams, schematic diagrams, wiring diagrams, connection and raceway diagrams.. Students will learn to read specification manuals and prints as applied to electrical installations in residential, commercial and industrial buildings.

Students will be introduced to some measuring and test equipment and will learn basic troubleshooting skills to determine voltage readings, resistance measurements, circuit continuity, open circuits, short circuits and grounds.

### **EL 202 Electricity for the Trades 2 - AC Circuit Analysis**

#### **Prerequisites: EL-101 Electricity for the Trades 1 – DC Circuit Analysis**

This is an introductory course for students in the electrical trade. The objective is for students to understand and perform circuit analysis on Alternating Current (AC) circuits.

The course builds on what students learned from the DC Circuit Analysis Class but expands to Alternating Current (AC) circuit analysis.

This course introduces students to how alternating current is generated, sinusoidal waveforms, AC power, phasors and phasor analysis of AC circuits with reactance (X) and impedance (Z), capacitance (C), and inductive (L) components. Students will solve simple RC – RL – and RLC circuits, using node voltage and mesh current analysis, superposition, Thevenin's and Norton's network theorems and equivalent circuits.

**EL 301 Residential Wiring**

This course covers residential wiring methods, implementing the NEC requirements. Installation rules and circuit designs for switches, receptacles, luminaires and appliances will also be discussed.

**EL 302 Commercial & Industrial Wiring,**

***Prerequisites: EL-301, Residential Wiring***

This course builds on residential wiring and covers commercial and industrial wiring methods, implementing the NEC requirements. Conductor sizing and various wiring method, and the installation of electrical systems in a commercial and industrial occupancies are to be discussed.

**EI 303 Electric Motors & Motor Controls**

***Prerequisites: Electricity for the Trades, and Electrical Print Reading and Electrical Troubleshooting***

This is course is intended to introduce students to the various types of DC and AC motors and also their control circuits, motor contactors, starters, limit switches, and ladder diagrams. Students will also learn to identify and understand symbols used in common control circuit drawings.

# HVAC/R SYSTEMS PROGRAM

The **HVAC/R Systems** program is a two-year discipline designed to provide students with a practical understanding of heating, ventilation, and air conditioning concepts as they apply to the field of construction. The core courses for the first year of the program focus on fundamental refrigeration concepts, where students revisit the mechanical functions of condensers, evaporators, compressors, and expansion valves.

Subsequent courses provide a thorough exposure to heat load calculations, electric power supply, and psychometrics and humidification. The program is rounded out with rigorous course work in control systems and applications. Throughout the program, students are able to “personalize” their instruction by choosing elective courses that they find relevant to their current employment and future career objectives.

## Who should enroll in the HVAC Systems Design program?

Individuals employed as HVAC mechanics, as well as engineers working in any of the diverse fields that rely on an integral understanding of heating, cooling, and boilers. Those working in the HVAC field in a managerial or supervisory capacity will also benefit from the thorough understanding of refrigeration theory provided by this program.

**Please note: The chart below represents a sample course sequence and may not reflect the order in which actual courses are completed.**

<b>Year</b>	<b>Semester</b>	<b>Code</b>	<b>Course Name</b>
First	First	HV FUN HV HYD	Fundamentals of HVAC/R Hydronic Heating Systems
First	Second	HV H20 HV HLC	Water Systems - Water Chillers & Cooling Towers Heat Load Calculations / Energy Codes
Second	First	HV DFE HV PSY	Air Systems - Ducts / Fans/ HVAC Equipment Psychrometrics & Humidification
Second	Second	HV EPS HV EST	Control Systems & Electric Power Supply Practicum & Estimating

### **HV FUN: Fundamentals of HVAC/R –An Overview**

The educational objective of this course is to provide the student with an introduction and a broad overview to the heating, ventilation, air conditioning, and refrigeration industry along with its history. Students will be provided with basic theory and specific examples in order to better understand the wide range of systems in use and how they have evolved as well as the direction the industry is going.

### **HV HYD: Hydronic Heating Systems**

Hydronics can be defined as a science that utilizes water or steam to transfer heat from the source where it is produced to an area where it can be used through a closed system of piping. Students will gain a working knowledge of boilers and terminal units used for hydronic heating systems, such as baseboard heaters, convectors, fan coil units, reheat coils and “radiators”. Different types of systems and materials used for heating applications will be discussed along with codes and standards that apply.

### **HV H2O: Water Systems – Water Chillers and Cooling Towers**

The removal of heat from conditioned spaces and equipment can be accomplished by different methods, but cooling towers, chillers, heat exchangers and pumps provide a means of providing water to remove heat effectively. Students will learn the difference between different types of cooling towers and chillers as well as common terms associated with water based systems including economizer operation and concerns associated with their operation.

### **HV HLC: Heat Load Calculations and Energy Codes**

The educational objective of this course is to provide an understanding of the basic concepts associated with estimating the heat loss and load used to size equipment for heating and cooling applications. Basic theory will be introduced as it is needed to accurately calculate the rate of heat transfer and temperature changes. Instructional topics include fundamentals of thermodynamics, heat capacity, heat transfer, heat loss and heat gain along with allowances for ventilation, and infiltration.

### **HV DFE: Air Systems - Ducts & Fans, and HVAC Equipment**

The educational objective of this course is to provide the student with a detailed understanding of the fundamentals of HVAC air distribution systems including, fan laws, fan curves and pressure drops. The concepts of the equal friction and velocity methods will be used. This course will also include review and analysis of an existing air distribution systems, indoor air quality concepts and an introduction to the testing, adjusting and balancing (TAB) industry.

### **HV PSY: Psychrometrics and Humidification**

The educational objective of this course is to introduce the student to the properties of moist air and the gas laws as they apply to the HVAC industry. The use of the Psychrometric chart in diagramming the conditions of air as it changes in pressure, volume, temperature, moisture and total energy is the central aspect of this class and students will be given a better understanding of how humidity effects comfort. Total, sensible and latent heat relationships are explained along with wet bulb temperature.



**HV EPS: Control Systems and Electric Power Supply**

The educational objective of this course is to provide the student with an introduction to the electrical concepts associated with the power requirements for HVAC&R equipment including electric motors and their control. Some basic HVAC control systems including pneumatic and electronic as well as direct digital controls and their applications within buildings will be studied.

**HV EST: HVAC/R Practicum and Estimating**

The intention of this class is to give the student the ability to take what they have gained from the program and develop an individual or group term project to pull together ideas as may be applicable to their interests. Site visits to observe the installation and operation of HVAC&R systems are intended. Also, an estimating approach to the industry will be provided including methods of organizing data.

# PLUMBING SYSTEMS PROGRAM

The **Plumbing Systems** program is a three-year discipline intended to provide students with a practical understanding of the NYC Plumbing Code, advanced plumbing theory, and plumbing design concepts as they apply to the field of construction. The core courses for the first year of the program focus on NYC code compliance, where the students are exposed to technical requirements mandated by the Department of Buildings.

Subsequent courses provide a thorough exposure to plumbing estimating, technical drafting, and blueprint reading. The program is rounded out with rigorous course work in plumbing design. Throughout the program, students are able to “personalize” their instruction by choosing elective courses that they find relevant to their current employment and future career objectives.

## Who should enroll in the Plumbing Systems program?

Individuals employed as plumbers’ helpers, as well as those working in any of the diverse fields that rely on an integral understanding of plumbing, heating, and sanitary systems. Those working in the plumbing field in a managerial or supervisory capacity will also benefit from the thorough understanding of plumbing theory provided by this program.

**Please note: The chart below represents a sample course sequence and may not reflect the order in which actual courses are completed.**

<b>Year</b>	<b>Semester</b>	<b>Code</b>	<b>Course Name</b>
First	First	<b>MA VOC PL 101</b>	<b>Vocational Mathematics Introduction to NYC Plumbing Code I</b>
First	Second	<b>VC 101 PL 102</b>	<b>Visual Communication Intro to NYC Plumbing Code II</b>
Second	First	<b>PH PRAC PL 201</b>	<b>Practical Physics Plumbing Theory I</b>
Second	Second	<b>PL 202 PL BPR</b>	<b>Plumbing Theory II Blueprint Reading for Plumbers</b>
Third	First	<b>PL 301 CD 101</b>	<b>Plumbing Design I Intro to AutoCAD</b>
Third	Second	<b>PL 302 CD 201</b>	<b>Plumbing Design II Intermediate AutoCAD</b>

**MA VOC Vocational Mathematics**

This course is a prerequisite for students entering the Electrical Technology or HVAC Systems Technology programs. The educational objective of this course is to enable those employed in said trades to solve the problems that may arise in their daily work. The basics of arithmetic, the use of formulas, and the simple applications of algebra and geometry, form the basis of the work in this course.

**PL 101 Introduction to NYC Plumbing Code I**

The course covers the fundamentals of sanitary and wastewater drainage and vent systems, domestic hot and cold water systems and natural gas systems. The students will be introduced to drafting procedures as applied to the preparation of plumbing floor plans and elevation drawings as a means of understanding and reading contract documents and shop drawings. The course includes an overview of the Plumbing Code with respect to location and content of the various disciplinary requirements.

**VC 101 Visual Communication**

This course is a requisite for students entering the Plumbing Technology and HVAC Systems programs. The educational objective of this course is to provide students with a working familiarity with drafting tools and their use. They will learn the use of equipment such as T-squares, triangles, scales, and compasses. Students will enhance their understanding of their trade by assignments in rendering art, plans, and visual concepts that communicate the architect's or contractor's perception.

**PL 102 Introduction to NYC Plumbing Code II**

This course continues with subjects on the fundamentals of the plumbing systems. The students will be required to prepare plumbing floor plans and elevation drawings of a low rise building in order to visualize and understand the various components of the systems.

**PH PRAC Practical Physics**

This course is a prerequisite for students entering the Electrical Technology or Plumbing Design Programs. The educational objective of this course is to re-familiarize students with the principles of physics which govern the processes of their industries. Course topics include lectures and experiments in energy, pressure, heat, fluids, and motion.

**PL 201 Plumbing Theory I**

This course introduces the student to the design of the plumbing and fire standpipe systems, including drafting layouts, application of the New York City Plumbing Code, with special emphasis on sizing, system perimeters and regulatory requirements, and lectures on the basic principles of hydraulics as applied to the flow of liquids and gases in a piping system.

**PL 202 Plumbing Theory II**

This course is a continuation of second year design and layout of plumbing and fire standpipe systems. The course will examine more detail in the design of high-rise multi-zone building with special emphasis on equipment selection for fire pumps, booster pumps, water heaters, and storm water drainage system design including site and roof retention and detention.

**PL BPR Blueprint Reading for Plumbers** (alternatively students may take AR BPR, below.)

The educational objective of this course is to introduce the plumbing student to the skills of understanding and reading plumbing-related blueprints and construction drawings, and to coordinate the information represented by each type of drawing.

**PL 301 Plumbing Design I**

An advanced third year in design of plumbing and fire standpipe systems, including shop-drawing layouts with slot and sleeve placement, and location and elevations with respect to benchmarks and building axis lines. The course will cover pressure ratings concerning the gravity and pneumatic pressure tanks for domestic water and fire protection systems.

**CD 101 Introduction to AutoCAD**

The educational objective of this course is to teach the student with a working knowledge of computers the fundamentals of Computer Aided Design (CAD), utilizing AutoCAD. The course focuses on the principles and conventions of CAD as used by the drafting/engineering professional, including Drawing Tools, Polylines, Layers, Text and Dimensioning.

**PL 302 Plumbing Design II**

This course continues with the focus on plumbing layout and fire protection systems. The course will cover the minimum code requirements for the design of low and high rise buildings and will explore and compare the cost implications of designing plumbing systems in excess of such minimum requirements, and the potential for any long term savings as a result of the implementation of more stringent construction procedures with respect to such systems.

**CD 201 Intermediate AutoCAD**

The educational objective of this course is to assist the student who has successfully completed CD I in acquiring intermediate skills in CAD. The course will cover all areas required for the student to produce professional quality two-dimensional drawings. Topics covered include Drawing Setup, Customizing AutoCAD, Scripts, Menus, Diesel, and Auto LISP Basics.

# CONSTRUCTION PROJECT MANAGEMENT

Project Management is the discipline of organizing and managing resources in such a way that these resources deliver all the work required to complete a project within defined scope, quality, time, and cost constraints. As a discipline, Project Management developed from different fields of application including architecture, construction, and engineering. The forefather of project management is considered to be Henry Gantt, who is acknowledged as the father of planning and control techniques.

<b>Year</b>	<b>Semester</b>	<b>Code</b>	<b>Course Name</b>
First	First	<b>PM ADM</b>	<b>Construction Administration</b>
		<b>PM MDS</b>	<b>Construction Methods &amp; Materials</b>
First	Second	<b>PM BPR</b>	<b>Blueprint Reading</b>
		<b>PM EST</b>	<b>Construction Cost Estimating</b>
Second	First	<b>PM SCH</b>	<b>Project Scheduling</b>
		<b>PM CNT</b>	<b>Contract Documents</b>
Second	Second	<b>PM SUS</b>	<b>Sustainability</b>
		<b>PM IBC</b>	<b>International Building Code</b>

**Please note: The above chart represents a sample course sequence and may not reflect the order in which actual courses are offered or completed.**

## **PM ADM Construction Administration**

The educational objective of this course is to understand how construction activities are properly managed and executed in order to achieve successful projects. As a result of new building technologies and evolving construction practices, managing construction is becoming increasingly complex. Topics include bidding and contract award process, quality control, shop drawings, field conditions and change orders, as well as understanding construction contracts, disputes and labor relations. Students will work on and prepare real-world documents and contract forms to develop a construction administration portfolio.

## **PM MDS Construction Methods and Materials**

The educational objective of this course is to introduce students to various materials used in construction, with an understanding of how they are used and installed. The course will follow the construction of a building starting with the foundation, through structure, finishes, and final completion. Students will gain a complete understanding of how buildings stand up and also provide safe, healthy environments for occupants. Students will learn proper construction terminology, code requirements, history and performance of materials, and basic architectural-engineering principles.

**PM BPR Blueprint Reading**

The educational objective of this course is to introduce the student to the skills of understanding and reading architectural, structural, mechanical and electrical construction drawings, and to coordinate the information represented by each type of drawing.

**PM EST Construction Cost Estimating**

The educational objective of this course is to introduce the student to estimating for the general construction trades. Major trades covered in class work are excavating, concrete, masonry, carpentry and plastering. Construction Procedures and trade practices are reviewed. Methods of taking off quantities from Construction Document Drawing and of organizing data are described. Typical problems and homework are analyzed in class. The general approach emphasizes the logical separation of material quantities and work operation, and is applicable to all construction trades.

**PM SCH Project Scheduling**

The educational objective of this course is to introduce the student to the scheduling aspects of a construction project. The student will learn how to create the initial timing schedule. Topics include scheduling of resources, costs, and personnel/labor. Using manual calculations to develop the schedule will provide the student with background and analysis prior to devoting time and effort to the actual scheduling.

**PM CNT Contract Documents**

The educational objective of this course is to introduce the student to an understanding of the Nature of Contracts. Course includes lectures on the bidding for and negotiating of construction contracts, contract administration, as well as handling claims and disputes, changes in the work of contracts, and completion of contracts and payments.

**PM SUS Sustainability**

The educational objective of this course is to provide the student with a detailed overview of sustainable, or "green", architecture, allowing him to understand the roles of the designer, builder, and manager in the process. The course balances the theoretical with the practical and presents its topics in a manner that is equally relevant to architects, engineers, interior designers, and construction project managers.

**PM IBC International Building Code**

The educational objective of this course is to provide the student with a fundamental understanding of the 2015 International Building Code. Students will learn how the code was developed and how it is used, as well as how it applies to design and construction. Upon course completion, students will have an understanding of the relationship between codes and practice in areas of design and construction.

# AUTOCAD & BIM CLASSES

## **CAD 1 Introduction to AutoCAD**

The educational objective of this course is to teach the student with a working knowledge of computers the fundamentals of Computer-Assisted Design (CAD), utilizing AutoCAD. The course focuses on the principles and conventions of CAD as used by the drafting/engineering professional, including Drawing Tools, Poly-lines, Layers, Text, and Dimensioning.

## **CAD 2 Intermediate AutoCAD Applications**

The educational objective of this course is to assist the student who has successfully completed CD I in acquiring intermediate skills in CAD. The course will cover all areas required for the student to produce professional quality two-dimensional drawings. Topics covered include Drawing Setup, Customizing AutoCAD, Scripts, Menus, Diesel, and Auto LISP Basics.

## **CAD 3 Advanced AutoCAD Applications**

The educational objective of this course is to provide advanced instruction to the student who has successfully completed CD 02 and a requisite course in drafting (or equivalent work experience). This course includes three-dimensional drawing, advanced dimensioning, data & image exchange, shading, rendering and solid modeling.

## **Introduction to Revit**

This course will cover the basics of Autodesk Revit, an important building information modeling software for architects, engineers, and contractors. This hands-on, lab-based class presents an overview of Autodesk's Revit platform, including architecture, structure, and MEP along with key concepts of BIM and Revit. The curriculum includes an in-depth exploration of the Revit interface. Views selection methods, levels and grid, walls, doors, windows, and components, modification commands and load family, floors, ceilings, and stairs, and type and instance parameters will be manipulated for existing project. Students will import CAD drawings to convert to Revit geometry, understand the project browser and type properties palettes, add sheets, insert views onto sheets, add dimensions and text to the model, and set up the file for plotting. Students will be given plans for a Commercial Building to build in Revit.

## **Intermediate Revit**

This class will advance students understanding of Revit techniques and concepts beyond what they have learned in the Intro to Revit course. The intermediate Revit course will allow students to expand their knowledge and use of the advanced features. The course will cover creating hosted and non-hosted families, a review of third party content, creating custom annotation entities and air terminal tags, as well as best practices and tips on templates.

THE GENERAL SOCIETY OF MECHANICS & TRADESMEN  
OF THE CITY OF NEW YORK

Founded 1785



Celebrating Over Two Centuries of Service to the People of the City of New York  
**ABOUT THE GENERAL SOCIETY OF MECHANICS & TRADESMEN**

The General Society of Mechanics & Tradesmen of the City of New York was founded in 1785 by the skilled craftsmen of the City. Today, this 232-year old organization continues to serve and improve the quality of life of the people of the City of New York through its educational, philanthropic and cultural programs including its **tuition-free Mechanics Institute, The General Society Library and its century old Lecture Series.**

In 1820, The General Society opened one of the City's first free schools as well as the Apprentices Library. The school, which became the Mechanics Institute in 1858, continues to provide tuition-free evening instruction in trades-related education and provides a critical service to improve job opportunities for New Yorkers in the building and construction industry. **Without a tuition-free education, many of our students would be unable to get the technical education needed to advance in today's environment. Each fall, over 300 students enroll in the Mechanics Institute's programs including Electrical Technology, HVAC/R Systems, Plumbing Systems, Construction Project Management, AutoCAD and BIM.**

Founded in 1820, **The General Society Library** is the second oldest library in New York City and one of three remaining membership circulating libraries. It serves the educational programs of The General Society. It also makes its extensive collections available to other institutions and the public. The book and periodical collections of the Library span two centuries and are suited to both scholarly research and recreational reading. Its archives date back to 1785. Library members also enjoy access to current fiction, biography, and non-fiction.

**The Labor, Literature and Landmarks Series** continues a tradition of public lectures that started at the Society in 1837. The Series brings people of diverse interests from the entire New York area into our Library space. Now in its seventh season, the Artisan Lecture Series pays tribute to the art of craftsmanship by featuring master artisans who lecture about the intricacies of their specialized crafts. **The Artisan Lecture Series** promotes the work and art of skilled craftsmen to assist in ensuring their unique knowledge is understood and carried forth for future generations.

The building at 20 West 44th Street is the fifth home of The General Society. **The Society also houses the unique John M. Mossman Lock Collection which has more than 370 locks, keys and tools, dating from 4000 B.C. to the early 20th-century.** The General Society of Mechanics & Tradesmen is listed on the National Register of Historic Places and the façade of the building is a New York City landmark.

The General Society is a 501(c)(3) nonprofit organization.

**The General Society of Mechanics & Tradesmen of the City of New York**

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