

**THE YOUNGSTOWN ASSOCIATION
SCHOOL (INCORPORATED)**

**THE
YOUNGSTOWN INSTITUTE
OF TECHNOLOGY
CATALOGUE**



1920 - 1921

**THE SCHOOL OF ENGINEERING
DIVISION**

**YOUNG MEN'S CHRISTIAN ASSOCIATION
YOUNGSTOWN, OHIO**

The Youngstown Institution of Technology

ANNUAL ANNOUNCEMENT
1920 - 1921

Students who are not able to meet the entrance requirements of The School of Engineering and those who wish training in mechanical trades should request a separate catalogue "The Youngstown Institute of Technology—Trade School Division."



OFFICES AND CLASS ROOMS
YOUNG MEN'S CHRISTIAN ASSOCIATION
CENTRAL BUILDING
17-21 NORTH CHAMPION STREET
LABORATORIES AND SHOPS
EAST RAYEN AVENUE

THE BOARD OF TRUSTEES

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President

W. C. STITT
First Vice President

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Second Vice President

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YOUNGSTOWN INSTITUTE OF TECHNOLOGY

Executive and Administrative

LEONARD T. SKEGGS

Director of The Youngstown Association School (Inc.)

J. H. SERVICE

Dean of The School of Technology

GUY A. WRIGHT

Assistant to the Director

REBECCA M. HEDEN

Secretary

IRENE CLARK

Registrar

LOWELL C. MASTERS

Director of Student Service

HELEN WRIGHT

Librarian

The Faculty

J. H. SERVICE

Dean and Head of the Department of Mechanical and Electrical Engineering

GUY FOSTER

Head of the Department of Chemistry

NORMAN IGO

Instructor in Chemistry and Physics

E. W. BENNAGE

Instructor in Chemistry

JOHN D. GOLD

Instructor in Metallurgy

J. W. EVERHARD

Instructor in Architecture

B. F. HARMONY

Instructor in Engineering Drawing

J. W. OWENS

Instructor in Engineering Drawing

GREGG A. DeLONG

THE YOUNGSTOWN INSTITUTE OF TECH

W. V. WALES

Instructor in Mathematics

C. W. RICKSECKER

Instructor in Mathematics

CHARLES D. LANSING

Instructor in Oxy-Acetelyne Welding

GEORGE E. FREASE

Instructor in Machine Shop Practice and Automotive Power

C. E. SEMPLE

Instructor in Automotive Power

EDGAR W. SAGE

Instructor in Machine Shop Practice and Automotive Power

MALCOLM HOGG

Instructor in Machine Shop Practice

HARRY PABST

Instructor in Electrical and Mechanical Engineering

*.....

Instructor in Mechanical Engineering

H. S. ROGERS

Instructor in Engineering

WILLIAM WILFORD

Instructor in Automotive Power

CLARK H. HARRIS

Instructor in Automotive Power

C. G. CHAPPEL

Instructor in Machine Shop Practice

*.....

Instructor in Tractor Construction and Repair

*.....

Instructor in Electrical and Mechanical Engineering

* To be appointed.

CALENDAR—1920-1921

September 15—October 4	Registration Days
October 4th	Opening Day—Sessions in all Classes
October 15th	Annual Students' Dinner
November 25th	Thanksgiving Day—No Classes
December 25th	Christmas Day—No Classes
January 1st	New Year's Day—No Classes
February 1st.....	Opening of Second Semester—New first year class admitted
February 22nd	Washington's Birthday—No Classes
May 30th	Memorial Day—No Classes
June 13th	Beginning of Commencement Week
June 15th	Opening of Summer Session
July 4th	Independence Day—No Classes
August 28th	Close of Summer Session

THE YOUNGSTOWN ASSOCIATION SCHOOL, Inc.

History and General Purpose

The Youngstown Association School was founded in 1888 by the Board of Trustees of the Youngstown Young Men's Christian Association as its Educational Department. Until 1915 the School bore the name of the "Association Institute." In 1915 the School was formally organized and incorporated under the laws of the State of Ohio.

From the beginning the chief purpose of the "Association School has been to render service along Educational lines to Employed Men and Boys of Youngstown and the Mahoning Valley. During the school year of 1919-1920 over twelve hundred different students were enrolled in the "Association School." The "Association School" is in a unique position to render distinct service to men and boys. It is in no sense a money-making institution, the tuition paid paying but part of the cost of operation. Classes are held during the day and evening, thus allowing men working on either or both day and night shifts to avail themselves of the opportunity of securing a thorough education without being forced to leave their regular occupations. A large percentage of the students are married men or men who need special training and who are not permitted because of financial circumstances or home ties to leave their regular occupations or homes.

Coming from a small school giving a few unrelated courses and taught by only two teachers, the years of 1920-1921 will find the School thoroughly organized with three departments of College Grade, with a highly trained faculty of eighty members, whose primary object is not that of securing compensation for their services but rather that of aiding in a sympathetic, helpful manner the fifteen hundred odd students who will enroll to secure a broader education, a wider vision and an increased usefulness.

ORGANIZATION

For the sake of administration the school is divided into seven divisions each under the direction of a Dean or Principal. The Organization of the School is as follows:

The Youngstown School of Law	Business School
The Youngstown School of Commerce and Finance	The Automotive School
The Youngstown Institute of Technology	The Elementary School for Employed Men
The Day and Evening High School	The Elementary School for Employed Boys

CHRISTIAN EMPHASIS

The Youngstown Association School, being maintained by the Youngstown Young Men's Christian Association, it goes without saying that a distinctly Christian emphasis is placed on all of its work. The development of highest Christian manhood through character building courses is the only excuse for the existence of the School. While the school is open to those of all faiths without question of creed or religious belief yet character building along definite Christian lines is at the background of all the School's work. This need not alarm any students of other than Christian faith as no pressure or attempt to influence or change a man's fundamental faith is countenanced.

THE YOUNGSTOWN INSTITUTE OF TECHNOLOGY THE SCHOOL OF ENGINEERING DIVISION

Purpose and Scope

The School of Engineering offers courses in Chemical, Electrical and Mechanical Engineering of College Grade. The work of the school is planned to provide adequate instruction in the Engineering lines for students who are required to earn their own living. Most of the students of the Schools of Engineering are employed men and boys who work either on day or night shifts and who attend the session of the school either day or evening. The courses given in the day and evening are identical in scope although the day courses are somewhat more thorough in their nature. The course has been stripped of all non-essentials, such subjects as modern and ancient languages, etc., which have cultural value but which are not essential to an engineering career have been omitted. Each of the three engineering courses, Mechanical, Electrical and Chemical, are four years in length although it is possible for a student of ability and ambition to complete any of the three in three years providing he chooses to attend the summer sessions of the school.

The curriculum of the School of Engineering is unique in that instruction is given not only in technical subjects, but such practical courses as Business Economics, History of Commerce, Factory Organization and Management and Production Methods are required of all students, which supplement the purely scientific subjects and fit a student upon graduation for Executive Positions in the Engineering world as well as purely technical positions. The school is one of only a few Engineering Schools in the country to recognize this need.

COOPERATION WITH INDUSTRIES

Through arrangements with heads of many Industries, Mills, etc., of the Mahoning Valley, arrangements are being made whereby students who are not working for their living are able to work part time to supplement their theoretical training.

CLASS ROOMS, LABORATORIES, ETC.

The School maintains twenty-seven splendid class rooms, offices, laboratories, library, etc. on the third floor of the Central Y. M. C. A., 17-21 North Champion Street. A modern Shop and Laboratory building, 106 feet by 50 feet, is also in operation at the intersection of Rayen Avenue and Champion Street, just two blocks North of the Central Building. Through a working agreement with the Reuben McMillan Free Library, the large Technical Department of the Library is always at the disposal of students.

FACTORY VISITATION

Heads of Industries of the Mahoning Valley, which produces 1-20 of the entire steel output of the world, are staunch friends of the Engineering School and cooperate in many ways with the officers and members of the Faculty. In practically EVERY course one or more visits to some mill or factory is made to supplement the formal work of the class room or laboratory.

FREE EMPLOYMENT SERVICE

It will be of interest to self-supporting students to know that the School conducts an Advisory and Employment Department in charge of an expert

Secretary. Students of the Youngstown Institute of Technology may avail themselves, free of charge, of this service and as a rule the Employment Department has many more calls for men than it can fill. Those in need of this service should communicate directly with the Advisory and Employment Secretary as early as possible before the opening of the School year, stating accurately their financial circumstances and in detail giving their experience and their wishes as to the character of work which they prefer. While no promises are made that positions will be secured, yet the history of the school shows that no ambitious student has ever been unable to secure a lucrative position.

ENTRANCE REQUIREMENTS

The requirements for entrance to the School of Engineering are the same as the standard set by the North Central Association of Colleges and Secondary Schools for admissions to colleges of liberal arts and other schools of collegiate grade.

It should be distinctly understood that the above is the minimum requirement for admission to the School of Engineering.

In order to form a broad foundation for the course of study, the following distribution of units of secondary school work is strongly recommended, and may be required by the Dean before approving a student's application for admission: three units in English, two in History, one in Physics or Chemistry and three in Mathematics.

SPECIAL STUDENTS

Certain applicants for admission, who are over twenty-one years of age may be admitted as special students. It is strongly urged that any persons who do not meet the entrance requirements, continue their secondary school work either in the High School Department of the Association School or in some other accredited institution before applying for admission. The Dean and the Faculty reserve the right to refuse any applicant admission whom they deem unprepared to carry the work of the school in a satisfactory manner even though the applicant may be able to meet the above minimum entrance requirements.

EXPENSES

Beginning with September, 1920, the tuition fee for all students entering the School of Engineering will be \$75.00 a year. This fee entitles a student to a Social Membership in the Youngstown Y. M. C. A. Should a student already hold a membership in the Y. M. C. A., the sum of \$5.00 will be deducted from his tuition.

The terms of payment are as follows: \$30.00 upon entrance; \$30.00 or before December 15th, and \$15.00 on or before February 15th.

Only under special circumstances are there any deviations from this rule. In the past it has been customary to charge students a small library fee. Beginning with the school year 1920-21 this will not be required.

Books may be purchased from the office of the "Association School." All books and supplies must be paid for at the time of purchase. Further directions to students will be found in Students' Hand Book which is supplied each student upon enrolling.

THE SCHOOL OF ENGINEERING—OUTLINE OF COURSES

Year Semester	Electrical Engineering	Mechanical Engineering	Chemical Engineering
FIRST YEAR	1st Semester Elements of Electrical Engineering (101) English 1 Engineering Drafting (120) College Algebra (140)	Elements of Mechanics 122 English 1 Engineering and Drafting 120 College Algebra 140	General Chemistry 150 English 1 Engineering and Drafting 120 College Algebra 140
	2nd Semester Electrical Measurements 102 English 2 Engineering Drafting 120 Trigonometry 141	Elements of Mechanics 123 English 2 Engineering Drafting 121 Trigonometry 141	General Chemistry 151 English 2 Engineering Drafting 121 Trigonometry 141
SECOND YEAR	1st Semester Direct Current Machinery 103 Analytical Geometry 143 Descriptive Geometry 126	Applied Mechanics 124 Descriptive Geometry 126 Machine Shop Practice 128 Analytical Geometry 143	Qualitative Analysis 152 Descriptive Geometry 126 Analytical Geometry 143
	2nd Semester Alternating Current Machinery 104 Calculus 144 Descriptive Geometry 127	Applied Mechanics 125 Descriptive Geometry 127 Machine Shop Practice 129 Calculus 144	Qualitative Analysis 153 Calculus 144 Descriptive Geometry 127
THIRD YEAR	1st Semester Electric Central Stations 105 Business Economics 131 Illumination 106	Strength of Materials 130 Machine Design 132 Business Economics 131 Elements of Electrical Engineering 101	Quantitative Analysis 154 Business Economics 131 Applied Electrochemistry 156
	2nd Semester Electric Railways 107 History of Commerce 142 Telephones and Telegraph 108	Heat Engines 134 History of Commerce 142 Machine Design 133	Quantitative Analysis 155 History of Commerce 142 Industrial Chemistry 157
FOURTH YEAR	1st Semester Wireless Telegraphy 109 Factory Organization and Management 341 Electrical Laboratory 110	Internal Combustion Engines 135 Factory Organization and Management 341 Power Engineering 136 Engineering Laboratory 137	Metallurgy of Iron and Steel 160 Factory Organization and Management 341 Industrial Chemistry 158
	2nd Semester Transmission and Distribution of Power 112 Production Methods E7 Electrical Laboratory 111 Thesis	Engineering Laboratory 138 Production Methods E7 Thesis	Metallurgy of Iron and Steel 161 Production Methods E7 Industrial Chemistry 159 Thesis

THE SCHOOL OF ENGINEERING**DESCRIPTION OF COURSES****DEPARTMENT OF ELECTRICAL ENGINEERING****THE ELEMENTS OF ELECTRICAL ENGINEERING—101.**

Principles and practice of generation, transmission, distribution and utilization of Electric Energy by means of continuous current with special reference to the performance and characteristics of generators and motors. The subjects treated are approached from the standpoint of concrete examples, principles being derived as needed.

ELECTRICAL MEASUREMENTS—102.

Theory and Practice of the more important methods of Precision measurement followed by a thorough study of modern indicating instruments for continuous current.

DIRECT CURRENT MACHINERY—103.

A study of the fundamental principles involved in the construction and operation of direct current generators and motors. Characteristic curves and the selection of machines for specific purposes, methods for installing and maintaining various types of generators and motors.

ALTERNATING CURRENT MACHINERY—104.

This course includes a study of fundamental principles and the design and construction of alternating current machinery, laboratory work and lectures dealing with generators, motors, converters, transformers, etc.

ELECTRIC CENTRAL STATIONS—105

This course includes the principles governing the installation and operation of power house and substation machinery and systems. Practical problems are given to illustrate principles and many visits are made to power plants.

ILLUMINATION—106.

A study of the various systems of distribution used in Arc and Incandescent lighting. Lectures on the manufacture and characteristics of the many forms of electric lamps, the selection of lighting for commercial work. In connection with this course special visits are made to factories manufacturing lighting materials.

ELECTRIC RAILWAYS—107.

This course includes a consideration of the design and operation of Electric Railway systems, power plants and substations. Problems are given which involve the study of the engineering features of modern railway development.

TELEPHONES AND TELEGRAPHS.

Application of electricity to telephones and telegraphs with a study of the construction and operation of apparatus required for the magneto, common battery and automatic exchanges. The principles of the operation of simple, duplex, quadruplex and simultaneous telegraphs.

WIRELESS TELEGRAPHY—109.

The principles of the application of electric waves to Wireless Telegraphy are followed by a study of various systems in commercial use. Some work is required in the actual setting up and operation of radio systems.

ELECTRICAL LABORATORY—110.

This course which is given in the first semester of the fourth year in Electrical Engineering is designed to provide students who are working in some particular phase of Electrical Engineering or those who are interested in a particular phase, an opportunity to do research work under the direction of a trained engineer. It is expected that the results of this course will provide the foundation for the work on the student's thesis during the following semester.

ELECTRICAL LABORATORY—111.

This course is a continuation of Electrical Laboratory 110.

TRANSMISSION AND DISTRIBUTION OF POWER—112.

This course includes a careful study of the different materials and means used in the transmission and distribution of electric power to various machines. Lecture and laboratory work will be supplemented by visits to factories using electric power.

DEPARTMENT OF MECHANICAL ENGINEERING**ENGINEERING DRAFTING—120.**

Practice in plain lettering; use of instruments; projection and simple work in drawing. The work consists of the completion of a number of plates, detailing, mechanical operations, etc.

ENGINEERING DRAFTING—121.

This course is a continuation of Engineering Drafting 120 including work of a more advanced nature.

ELEMENTS OF MECHANICS—122.

A study of the fundamental principles of Applied Physics. This course provides a basis for all future courses in the Department of Mechanical Engineering. It contains a thorough review of the principles usually taught in Secondary School Physics and considerable work of advanced nature.

ELEMENTS OF MECHANICS—123.

This course is a continuation of Elements of Mechanics 122 and is given immediately following it.

APPLIED MECHANICS—124.

This course deals with the following topics: Analysis of Static forces, Moments, Couples, Center of Gravity, Stresses in Frames including graphic Statics, Analysis of Velocities and Acceleration both Algebraically and by Graphs. The determination of centrifugal force impact, momentum and inertia. Work, energy and power. The laws of friction.

APPLIED MECHANICS—125.

This course is a continuation of Applied Mechanics 124.

DESCRIPTIVE GEOMETRY—126.

The detailing of Machinery and drawing to scale from blue prints. Tracing and Blue Printing and the representation of flat and rounded surfaces by ink shading. Its relation to Mechanical drafting and the solution of such problems relating to magnitudes in space as bear directly upon those which present themselves to Engineers.

MACHINE SHOP PRACTICE—128.

This course includes operation and actual production work on Lathes, Shapers, Milling Machines, etc. The entire course is made up of Laboratory work.

MACHINE SHOP PRACTICE—129.

This course is a continuation of Machine Shop Practice 128.

DESCRIPTIVE GEOMETRY—127.

This course is a continuation of Descriptive Geometry 126.

STRENGTH OF MATERIALS—130.

A careful study of the strains and stresses of various materials used in machine design with special laboratory experiments to determine the relative strength of these various materials.

MACHINE DESIGN—132.

Elementary work in free hand sketching of the details of machinery and the making of working drawings of the same. Calculations and drawings of a simple type punching press.

MACHINE DESIGN—133.

This course is a continuation of Machine Design 132 and is given immediately following it.

HEAT ENGINES—134.

This course includes the study of thermodynamics and its application to the following heat engines: Steam boiler, the steam engine and turbine, air compressors, refrigerating machinery, internal combustion engines, and steam power plant auxiliaries. The theory of combustion and a study of fuels are also included. Types of valve, gears, governors, and other auxiliary mechanism are discussed.

INTERNAL COMBUSTION ENGINES—135.

Internal Combustion Engine fuels and the theory of their combustion are studied together with the types of engines. Calculation of cylinder sizes for a required capacity and design of the gas engine. The theoretical work of this course is supplemented by a great deal of practical work in the Automotive Laboratories.

POWER ENGINEERING—136.

This course deals with engine plants, central heating systems, compressed air plants and refrigerating equipment. Rate making based on fixed charges, service expense and operating cost is also discussed.

ENGINEERING LABORATORY—137.

This course which is given in the first semester of the fourth year in Mechanical Engineering is designed to provide students who are working in some particular phase of Engineering or those who may be interested in some particular phase to do research work under the direction of a trained engineer. It is expected that the results of this course will provide the foundation for the work on the student's thesis during the following semester.

ENGINEERING LABORATORY—138.

This course is a continuation of Engineering Laboratory 137 and is given immediately following it.

DEPARTMENT OF MATHEMATICS**COLLEGE ALGEBRA—140.**

This course aims to give a general review of advanced algebra. The work includes quadratics with graphical representations, variation, binomial theorem, logarithms, complex numbers and progressions.

PLANE TRIGONOMETRY—141.

The work includes trigonometric equations, solution of plane triangles and inverse functions. Effort is made to acquaint the student with the means of testing the accuracy of his work and to develop habits of neat arrangement and rough checking in his computations. Numerous applications to practical problems are made.

PLANE ANALYTIC GEOMETRY—142.

The work includes: The straight-line and general equations of the first degree, polar co-ordinates, transformation of co-ordinates, conic sections and equations of the second degree, tangents, normals, loci, parametric equations, poles and polars, the general equation of the second degree, and a few higher plane curves.

CALCULUS—143.

The work includes theory of limits, differentiations, series, expansion of functions, indeterminate forms, maxima and minima of functions of one or more variables, partial derivations, curvatures, tangents and normals.

THE DEPARTMENT OF ENGLISH

ENGLISH 1. Freshman College English required of all students in the School of Engineering. The course consists of a careful review of Composition and Rhetoric with special emphasis on weekly themes which are assigned written, corrected and returned for correction.

ENGLISH 2. Continuation of English 1 and taught immediately following it. Work in Public Speaking is also given during this semester to supplement the consideration of written work and class discussions.

DEPARTMENT OF CHEMISTRY AND METALLURGY**GENERAL CHEMISTRY—150.**

General Chemistry 150. Elementary Inorganic Chemistry. A study of the non-metals and metals. Special attention is given those elements and