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AUTHOR Gourley, Frank A., Jr., Comp.
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ABSTRACT

With the enactment of the Occupational Safety and Health Act of 1970, the need for manpower development in the field of industrial safety and hygiene has resulted in the development of a broad based program in Occupational Safety and Health. The manual provides information to administrators and instructors on a program of study in this field for the community college system of North Carolina. Included in the document is information on student recruitment, instructional resources, equivalent course work, curriculum purpose, job descriptions, and the four curriculum levels for use in the development of courses (24 required courses, 11 occupational safety and health technology electives, and 8 social science electives). Further information includes a brief course description; prerequisites needed; required class, laboratory, and credit hours; major course divisions; and suggested resource materials. (BP)

OCCUPATIONAL SAFETY AND HEALTH

CURRICULUM MANUAL

June, 1973

INSTRUCTIONAL LABORATORY
DEPARTMENT OF COMMUNITY COLLEGES
RALEIGH, NORTH CAROLINA

FOREWORD

This Occupational Safety and Health Curriculum Manual provides information on a program of study in the field of occupational safety and health. Curriculum information has been developed with the aid of a Statewide Curriculum Advisory Committee. Institutions interested in this curriculum may wish to consult with members of the advisory committee, and with others, to tailor a program to meet their local and regional needs. Consulting services are available from the Department for those interested.

Roger G. Worthington
Director
Instructional Laboratory

Ben E. Fountain, Jr.
Ben E. Fountain, President
Department of Community Colleges

PREFACE

The purpose of this manual is to provide information to administrators and instructors in the Community College System of North Carolina who are interested in offering a program of study in occupational safety and health. Included is information on the curriculum and instructional resources.

The manual was compiled by Frank A. Gourley, Jr. and reflects the cooperation and counsel of the Statewide Occupational Safety and Health Advisory Committee. The committee reviewed and presented constructive criticisms regarding the curriculum guide and instructional topics. However, the review does not imply endorsement of the entire contents of this manual.

ACKNOWLEDGEMENTS

The Occupational Education Division of the North Carolina Department of Community Colleges recognizes the valuable contributions made by the State Advisory Committee in the development of the Occupational Safety and Health Technology. The committee includes individuals with local, state, and national responsibilities in the field of occupational safety and health.

Max Avery, Safety Inspector
N. C. Department of Labor
Raleigh, NC

H. S. Baucom, Director
Industrial Commission
N. C. Department of Commerce
Raleigh, NC

Ray Boylston, OSHA Director
N. C. Department of Labor
Raleigh, NC

Dr. John L. Brockmann, M.D.
High Point, NC

Henry F. Crawford, Safety Director
Western Electric Corporation
Burlington, NC

Fred Ellington, Safety Engineer
Carolina Power & Light Company
Raleigh, NC

Dr. David Fraser, Professor
Dept. of Environmental Sciences and Engineering
UNC-Chapel Hill
Chapel Hill, NC

Roamless Hudson
Industrial Hygiene Department
St. Augustine College
Raleigh, NC

John C. Lumsden, Chief
Board of Health
N. C. Department of Human Resources
Raleigh, NC

John D. Neefus, Industrial Hygienist
Burlington Industries
Greensboro, NC

Dr. Larry Royster
Mechanical & Aerospace Engr. Dept.
N. C. State University
Raleigh, NC

Bill Silver, Safety Administrator
City of Charlotte
Charlotte, NC

Dr. Thomas Benton, Dean of Instruction
Lenoir Community College
Kinston, NC

John Burns
Rowan Technical Institute
Salisbury, NC

John Hamil
Guilford Technical Institute
Jamestown, NC

George McSwain, Dean of Instruction
Gaston College
Dallas, NC

Jerry Owens, Dean of Instruction
Guilford Technical Institute
Jamestown, NC

Department of Community Colleges Staff

Frank A. Gourley, Jr.
Department of Community Colleges
Raleigh, NC

Don J. Moore, Supervisor of Management Development Program
Department of Community Colleges
Raleigh, NC

Joe E. Sturdivant, Director of Industrial Services
Department of Community Colleges
Raleigh, NC

Roger G. Worthington, Director
Instructional Laboratory
Department of Community Colleges
Raleigh, NC

CONTENTS

OCCUPATIONAL SAFETY AND HEALTH CURRICULUM

The Occupational Safety and Health Curriculum has been developed to meet a continuing need identified by industry for persons with a background in safety and health. Throughout the Community College System courses and seminars have been conducted to update industrial personnel in their present responsibility for the safety and health of their employees. The Occupational Safety and Health Curriculum will supplement these efforts with longer term study opportunities for industrial personnel and others wishing to become involved in the field. The purpose of this curriculum is to provide a multilevel approach as a guide in meeting the needs of local industries for persons with experience in safety and health. Institutions should discuss the curriculum with local industries before deciding at what level they will offer the program. In most institutions, the course or certificate level (technical specialty) will be adequate to meet the needs of local industry. In selected areas, it might be necessary to offer the full comprehensive program to meet both the immediate needs and the foreseeable long range needs for additional full time personnel in safety and health for industry.

It should be recognized that this curriculum merges two disciplines--industrial hygiene and safety engineering--both previously offered only at the baccalaureate or graduate level. Due to the recent demand caused by the enactment of the Occupational Safety and Health Act of 1970 (PL 91-596), it has become evident that the manpower void cannot be satisfied only by professionals possessing the baccalaureate and advanced degrees; but that the professionals can function more efficiently with the assistance of paraprofessionals.

STUDENTS

An institution considering the implementation of a program in Occupational Safety and Health should study the student potential in its service area. Indications are that the major demand for education in this field will come initially from individuals employed full time with potential responsibility in safety and health. For these individuals, a series of courses perhaps leading to the certificate should be adequate. As enrollment in such courses matures, the institution might wish to consider offering the diploma or degree program. In selected areas, where the interest of recent high school graduates is sufficient, the diploma or degree program might be initiated. In such case, efforts should be made to introduce students to the industrial world of work as soon as possible. Case studies, field trips, speakers from industry, and cooperative education experiences are some methods of providing this important contact to the Occupational Safety and Health student.

INSTRUCTIONAL RESOURCES

The Occupational Safety and Health Curriculum is a broad based program that integrates two previously separate disciplines - Industrial Safety and Industrial Hygiene. As such, the institution should carefully consider its

instructional resources for the program. Some related courses, such as Fire Prevention Programs, Chemistry of Flammable Materials, Electrical Safety, Anatomy and Physiology, Physics, etc., can, perhaps, be taught by the existing faculty. Other courses, such as Hazard Identification and Control, Elements of Industrial Hygiene, and Safety Program Management, will require special expertise not likely to be found presently on the campus. If such an individual is present, the institution should consider itself fortunate in being able to respond directly to the demand.

Whatever the institution's instructional situation regarding Occupational Safety and Health, it should consider the resources available from other educational institutions and industry. Included in those institutions in the Southeast that offer safety and health oriented programs are the University of North Carolina, Chapel Hill, and N. C. State University. The UNC School of Public Health offers a graduate program in Air & Industrial Hygiene. The faculty is interested and able to provide consulting and instructional services to the community colleges and technical institutes. Contact Area Health Education Centers, School of Public Health, University of North Carolina, Chapel Hill or individuals within the School of Public Health. N. C. State University offers a graduate program in Systems Safety Engineering within the Department of Industrial Engineering. Individuals in that program can also provide assistance. Clemson University in South Carolina offers an undergraduate program in safety for those interested in a source of instructors with a bachelor's degree.

Individuals contacted in industry and insurance have been most willing to provide assistance in the development of this program and have indicated a willingness to support educational programs when they are established, with lectures and visits to the plant. Good resources for this kind of assistance are the American Society of Safety Engineers, North Carolina and Tarheel Chapters, and members of the American Industrial Hygiene Association. These organizations can also be helpful in locating instructors for courses offered in this curriculum.

Two curriculum manuals have been developed recently with funding from the National Institute for Occupational Safety and Health (NIOSH). They contain survey information, recommended curriculum guide, course information, and equipment lists. The titles are Curriculum Guide for Occupational Safety and Health Technicians (California Community Colleges, 1972) and Development of Associate and Baccalaureate Degree Programs for Occupational Safety and Health Personnel (Texas A&M University, 1972). These publications are available on request from NIOSH, Public Health Service, Department of Health, Education, and Welfare, U.S. Post Office and Court House, Cincinnati, Ohio 45202.

EQUIVALENT COURSE WORK

Because of the recent need expressed by industry for instruction in Occupational Safety and Health, short courses, seminars, and extension courses have been developed and offered across the State by various institutions. Some of these courses cover topical areas parallel to the courses described in the Curriculum Guide for the Occupational Safety and Health Program.

Institutions offering a program in Occupational Safety and Health should consider the background of individuals with exposure to previous courses in the field, and perhaps waiver these courses to avoid repetition of effort by the student. For example, the student having completed short courses on Record Keeping, American Red Cross First Aid, and Key Man Development might receive equivalent credit for this work toward T-ISC 101, Introduction to Occupational Safety and Health. Other courses that might be considered similarly include: MDP 24 Principles of Business and Industrial Management for T-ISC 120 Principles of Industrial Management, MDP 51 Principles of Supervision for T-BUS 272 Principles of Supervision, MDP 15 Industrial Safety and Accident Prevention for parts (I-V) of T-ISC 124 Human Factors in Safety, and MDP 5 Economics in Business and Industry for partial credit toward T-ECO 102 Economics.

CURRICULUM GUIDE

OCCUPATIONAL SAFETY AND HEALTH TECHNOLOGY

INTRODUCTION

Purpose of Curriculum

Modern concerns for the occupational safety and health of individuals have their origin with the advent of the factory system. With the factory system the concept of responsibility for diseased and injured workers became an issue. The alleviation of the suffering took two courses: (1) the struggle for laws to compensate injured workers and their families, and (2) laws to regulate working conditions. Thus the safety profession was born. Early safety practitioners had little formal safety training and were usually engineers, production men, or personnel men. In general safety engineers received their knowledge by experience, though a few colleges did offer safety engineering courses.

Along with the recognition that injuries from mechanical sources could be prevented came the recognition that exposure to toxicants was an equally and perhaps more insidious cause of harm to the worker. Fire losses also came to be recognized as preventable. From these came the development of safety engineering, industrial hygiere and fire protection engineering as cooperative disciplines. Also, in recent years many groups, and in particular organized labor, have sought increased legislation to control the work environment. There have been many Federal and State laws, but the Williams-Steiger Occupational Safety and Health Act of 1970 is the most comprehensive and stringent, and imposes vastly increased responsibility on employers, government agencies at all levels, and the safety professions. These events have pointed up the necessity for increased education in the occupational safety and health field.

Job Description

The Safety and Health Technician is defined as a person who possesses basic scientific knowledge and technical skills that allow him to support the activities of safety and health professionals. The technician is primarily concerned with the application of attained knowledge in such tasks as monitoring, surveying, and inspecting the safety and health aspects of a work place. The technician works under supervision, performing tasks such as record keeping, conducting regular inspections, safety training, or accident investigation.

Industries using Safety and Health Technicians include the chemical industry, construction, aerospace, publishing, electronics, insurance companies, utilities, federal agencies, State agencies, and various cities and counties. The graduate from the technology curriculum will most likely be employed in government as an enforcement officer, in insurance as a field loss control representative, as an inspector in the construction industry, or as a junior safety and health assistant in a variety of manufacturing or service industries.

ADVISORY COMMITTEE

The Instructional Laboratory of the Department of Community Colleges recognizes the valuable contributions of the following persons who served as members of the Occupational Safety and Health Committee.

Max Avery, Safety Inspector
N. C. Department of Labor
Raleigh, NC

H. S. Baucom, Director
Industrial Commission
N. C. Department of Commerce
Raleigh, NC

Ray Boylston, OSHA Director
N. C. Department of Labor
Raleigh, NC

Dr. John L. Brockmann, M.D.
High Point, NC

Henry F. Crawford, Safety Director
Western Electric Corporation
Burlington, NC

Fred Ellington, Safety Engineer
Carolina Power & Light Company
Raleigh, NC

Dr. David Fraser, Professor
Dept. of Environmental Sciences
and Engineering
UNC-Chapel Hill
Chapel Hill, NC

Roamless Hudson
Industrial Hygiene Department
St. Augustine College
Raleigh, NC

John C. Lumsden, Chief
Board of Health
N. C. Department of Human Resources
Raleigh, NC

John D. Neefus, Industrial Hygienist
Burlington Industries
Greensboro, NC

Dr. Larry Royster
Mechanical & Aerospace Engr. Dept.
N. C. State University
Raleigh, NC

Bill Silver, Safety Administrator
City of Charlotte
Charlotte, NC

Dr. Thomas Benton, Dean of
Instruction
Lenoir Community College
Kinston, NC

John Burns
Rowan Technical Institute
Salisbury, NC

John Hamil
Guilford Technical Institute
Jamestown, NC

George McSwain, Dean of Instruction
Gaston College
Dallas, NC

Jerry Owens, Dean of Instruction
Guilford Technical Institute
Jamestown, NC

Frank A. Gourley, Jr.
Department of Community Colleges
Raleigh, NC

Don J. Moore, Supervisor of Manage-
ment Development Program
Department of Community Colleges
Raleigh, NC

Joe E. Sturdivant, Director of
Industrial Services
Department of Community Colleges
Raleigh, NC

Roger G. Worthington, Director
Instructional Laboratory
Department of Community Colleges
Raleigh, NC

SUGGESTED CURRICULUM PATTERN

As a result of discussion by the Occupational Safety and Health Advisory Committee of educational needs in the field of Occupational Safety and Health, the following curriculum options have been proposed. Four levels were considered in the design of the Occupational Safety and Health Technology Curriculum Guide.

The first level is for those individuals currently employed in the field of Occupational Safety and Health who wish to further their knowledge. Each course can, for those individuals with proper experience or educational background, be taken for its own merit. Also, supervisors and managers may wish to take one or more of the safety and health courses.

The second level is the certificate program for individuals either possessing a degree or who do not wish to pursue the full requirements of an associate degree. These students would take only Occupational Safety and Health courses specified for the certificate.

The third level is for students pursuing the Occupational Safety and Health Program as outlined in the curriculum guide, but wish to terminate their education after four quarters of study. Sufficient courses in the occupational specialty have been scheduled in the first year to provide the student with employment skills in the field. In this case a diploma may be awarded.

The fourth level is for students pursuing the Associate in Applied Science degree in Occupational Safety and Health. Individuals completing the program as outlined in the curriculum guide will receive instruction in the second year on topics related to safety and health, including human factors, industrial hygiene, and administration.

SUGGESTED OCCUPATIONAL SAFETY AND HEALTH TECHNICAL SPECIALTY

Institutions may wish to develop a part-time educational program for supervisors and directors of safety to provide this group with a formal structure for getting additional background in occupational safety and health. The following courses or their equivalent have been recommended to provide individuals with the competencies necessary to direct a basic safety and health program.

Basic Courses:		Class	Lab	Credit	Contact	
T-ISC 101	Introduction to Occupational Safety and Health	3	0	3	33	
T-ISC 103	Safety Program Management	3	0	3	33	
T-ISC 111	Hazard Identification and Control	3	2	4	55	
T-ISC 112	Physical Hazards Control	3	2	4	55	
T-ISC 224	Elements of Industrial Hygiene	3	3	4	66	
T-FIP 115	Fire Prevention Programs	3	0	3	33	
						275

And at Least Two Additional Courses Selected from the Following:

T-ISC 104	Safety and Health Standards, Codes and Regulations	3	0	3	33	
T-ISC 120	Principles of Industrial Management	3	2	4	55	
T-ISC 125	Traffic and Fleet Safety	3	0	3	33	
T-ISC 124	Human Factors in Safety	3	3	4	66	
T-ISC 225	Techniques of Industrial Hygiene	3	3	4	66	
T-CHM 101	Chemistry	3	3	4	66	
T-FIP 218	Chemistry of Hazardous Materials	3	2	4	55	
T-BIO 101	Human Anatomy and Physiology	3	3	4	66	
						110

Total Contact Hours (minimum) 385

SUGGESTED CURRRICULUM BY QUARTERS

	Course Title	Hours Per Week		Quarter Hours
FIRST QUARTER		Class	Lab.	Credit
T-ENG 101	Grammar	3	0	3
T-ISC 101	Introduction to Occupational Safety and Health	3	0	3
T-ISC 103	Safety Program Management	3	0	3
T-ISC 120	Principles of Industrial Management	3	2	4
T-MAT 101	Technical Mathematics	5	0	5
		17	2	18
SECOND QUARTER				
T-ENG 102	Composition	3	0	3
T-ISC 111	Hazard Identification and Control	3	2	4
T-FIP 115	Fire Prevention Programs	3	0	3
T-DFT 118	Drafting and Blueprint Interpretation	0	6	2
T-CHM 101	Chemistry	4	2	5
		13	10	17
THIRD QUARTER				
T-ENG 103	Report Writing	3	0	3
T-ISC 112	Physical Hazards Control	3	2	4
T-BIO 101	Human Anatomy and Physiology	4	2	5
T-PHY 118	Physics	3	2	4
T-ELC 106	Electrical Safety	1	3	2
		14	9	18
FOURTH QUARTER				
T-ENG 204	Oral Communication	3	0	3
T-MAT 211	Basic Statistics	3	0	3
T-FIP 218	Chemistry of Hazardous Materials	3	2	4
T-ISC 124	Human Factors in Safety	3	3	4
T-ISC 104	Safety and Health Standards, Codes and Regulations	3	0	3
		15	5	17
FIFTH QUARTER				
_____	Social Science Elective*	3	0	3
T-ISC 224	Elements of Industrial Hygiene	3	3	4
T-ECO 102	Economics	3	0	3
_____	Technical Elective			9
		15	8	19

SIXTH QUARTER		Hours Per Week		Quarter Hours
		Class	Lab.	Credit
	Social Science Elective*	3	0	3
T-ISC 21[illegible]	Techniques of Industrial Hygiene	3	3	4
T-BUS 21[illegible]	Business Management	3	0	3
	Technical Elective			9
		9	3	19
	Total Quarter Hours in Courses			90
	Electives			18
	Total			108

*Refer to electives suggested in this guide.

COURSE DESCRIPTIONS BY QUARTERS

FIRST QUARTER	Hours Per Week Class	Lab.	Quarter Hours Credit
T-ENG 101 Grammar	3	0	3

Designed to aid the student in the improvement of self-expression in grammar. The approach is functional, with emphasis on grammar, diction, sentence structure, punctuation, and spelling. Intended to stimulate students in applying the basic principles of English grammar in their day-to-day situations in industry and social life.
Prerequisite: None

T-ISC 101 Introduction to Occupational Safety and Health	3	0	3

An introduction to the principles of occupational safety and health and the hazards faced by persons employed in industrial plants. A survey course covering record-keeping requirements, first aid, and the key man development preparing potential management and supervisory personnel for certificates in these areas.
Prerequisite: None

T-ISC 103 Safety Program Management	3	0	3

Course to examine and define the structure of a typical industrial concern and the safety organization and its planning and budgeting process. To develop ability to plan and organize programs suitable for various types of facilities.
Prerequisite: None

T-ISC 120 Principles of Industrial Management	3	2	4

The basic managerial decisions; organizational structure including plant location, building requirements, and internal factory organization; problems of factory operation and control, planning, scheduling, routing factory production, stores control, labor control, purchasing, cost control. Plant problems are utilized as lab experiments.
Prerequisite: None

T-MAT 101 Technical Mathematics	5	0	5

The real number system is developed as an extension of natural numbers. Number systems of various bases are introduced. Fundamental algebraic operations, the rectangular coordinate system, as well as fundamental trigonometric concepts and operations are introduced. The application of these principles to practical problems is stressed.
Prerequisite: Satisfactory evidence that admission requirements have been met.

SECOND QUARTER

T-ENG 102 Composition 3 0 3
Designed to aid the student in the improvement of self-expression in business and technical composition. Emphasis is on the sentence, paragraph and whole composition.
Prerequisite: T-ENG 101

T-ISC 111 Hazard Identification and Control 3 2 4
An examination of hazards in the work environment and methods of control. Noise abatement, eye protection and other prevalent hazards will be studied in reference to regulatory standards. Preventative design, layout and planning considerations will be introduced.
Prerequisite: T-ISC 101

T-FIP 115 Fire Prevention Programs 3 0 3
Principles and applications of fire prevention related to the community and industrial plants. The development and maintenance of fire prevention programs, educational programs, and inspection programs. Specific applications of related disciplines to fire prevention problems.
Prerequisite: None

T-DFT 118 Drafting and Blueprint Interpretation 0 6 2
Basic drafting techniques are covered to provide a working knowledge of drafting as a tool for communicating ideas. Reading and interpreting of blueprints is emphasized.
Prerequisite: None

T-CHM 101 Chemistry 4 2 5
Study of the physical and chemical properties of substances, chemical changes; elements, compounds, gases, chemical combinations; weights and measurements; theory of metals; acids, bases, salts, solvents, solutions, and emulsions. In addition, study of carbohydrates; electrochemistry, electrolytes, and electrolysis in their application of chemistry to industry.
Prerequisite: T-MAT 101

THIRD QUARTER

T-ENG 103 Report Writing 3 0 3
The fundamentals of English are utilized as a background for the organization and techniques of modern report writing. Exercises in developing typical reports, and using writing techniques and graphic devices are completed by the students. Practical application in the preparation of a full-length report is required of each student at the end of the term. This report must have to do with something in his chosen curriculum.
Prerequisite: T-ENG 102

T-ISC 112 Physical Hazards Control 3 2 4
Study of physical hazards and their control in the work environment. Study of common physical hazards in industry and the appropriate corrective measures to remove these hazards.
Prerequisite: T-ISC 111

T-BIO 101 Human Anatomy and Physiology 4 2 5
A study of the organizational plan of the human body and one of the body systems concerned with motor activities, control and integration of functions, and reproduction. Laboratory experiences provide opportunities to see animal specimens illustrative of systems being studied.
Prerequisite: None

T-PHY 118 Physics 3 2 4
Aspects of static and dynamic forces. Basics of work, energy, and power. Mechanical properties of liquids, solids, and gases. Principles and formula applicable to situations in the program specialty are stressed.
Prerequisite: T-MAT 105 or equivalent

T-ELC 106 Electrical Safety 1 3 2
Requirements and procedures encountered in utility operations, business, and household electrical safety. Electrical concepts, including voltage current, resistance, capacitance, and inductance as related to practical circuit applications. Reading and interpreting electrical symbols, schematics, and National Code. Use of electronic measuring devices.
Prerequisite: T-PHY 118

FOURTH QUARTER

T-ENG 204 Oral Communication 3 0 3
A study of basic concepts and principles of oral communications to enable the student to communicate with others. Emphasis is placed on the speaker's attitude, improving diction, voice, and the application of particular techniques of theory to correct speaking habits and to produce effective oral presentation. Particular attention given to conducting meetings, conferences, and interviews.
Prerequisite: T-ENG 101

T-MAT 211 Basic Statistics 3 0 3
An introduction to basic concepts of statistics, including point and interval estimates; chi-squares; frequency distribution; ratios, rates and percentages. Normal distribution, mean and standard deviation, interval estimates, t-distribution, and coefficient of variation are covered.
Prerequisite: None

T-FIP 218 Chemistry of Hazardous Materials 3 2 4
Theories of combustion and extinguishment, including the analysis of flammable materials and the nature of extinguishing agents. The properties of matter affecting fire behavior. The application of the laws and principles of chemistry and physics to the use, storage, and disposal of flammable solids, liquids, gases, and dusts.
Prerequisite: T-CHM 101

T-ISC 124 Human Factors in Safety 3 3 4
Designed to acquaint the student with the physiological and psychological factors that contribute to accident causation. Relationship of motivation and morale to accident prevention. Study of human factors in machine and environmental design and those factors as they influence accident rates.
Prerequisite: T-ISC 112

T-ISC 104 Safety and Health Standards, Codes and Regulations 3 0 3
A review of the important occupational safety and health standards, codes, and laws with particular emphasis on application of these codes to typical work situations. Study of regulatory and insurance agencies and their responsibilities to the occupational safety and health of individuals.
Prerequisite: T-ISC 101 or equivalent

FIFTH QUARTER

T-ISC 224 Elements of Industrial Hygiene 3 3 4
Course designed to develop understanding of broad concepts of Industrial Hygiene and to develop ability to recognize potentially hazardous environmental conditions. A survey of the effects of toxic agents on the body and general methods of control will be included.
Prerequisite: T-ISC 112

T-ECO 102 Economics 3 0 3
The fundamental principles of economics, including the institutions and practices by which people gain a livelihood. Included is a study of the laws of supply and demand and the principles bearing upon production, exchange, distribution, and consumption, both in relation to the individual enterprise and to society at large.
Prerequisite: None

SIXTH QUARTER

T-ISC 225 Techniques of Industrial Hygiene 3 3 4
Course to develop ability to select and use appropriate field equipment to detect and monitor toxic substances under professional guidance.
Prerequisite: T-ISC 224

T-BUS 235 Business Management 3 0 3
Principles of business management, including overview of major functions of management, such as planning, staffing, controlling, directing, and financing. Clarification of the decision-making function versus the operating function. Role of management in business--qualifications and requirements.
Prerequisite: None

ELECTIVES

An appropriate list of electives for this curriculum is shown from which the institution may select courses to complete the program of study. The institution has the prerogative to develop new courses for the electives or to modify courses from the suggested list to fulfill the local objectives. It is suggested, however, that technical courses be appropriate to the major area of study; that they not change or alter the major objectives of the program nor create a false impression of proficiency in an area either related or foreign to the major.

Elective courses must be selected from an associate degree course or new courses should be developed at a comparable level. The institution may elect to require certain courses or may let the student select an appropriate course.

OCCUPATIONAL SAFETY AND HEALTH TECHNOLOGY

T-ISC 125 Traffic and Fleet Safety 3 0 3
A basic introduction to problems and practices of Motor Traffic and Fleet Safety, with emphasis on the ability to plan and administer a safety program of small fleet or provide assistance in administration of a large fleet program. Study of traffic legislations, traffic control, and automotive transportation problems.
Prerequisite: T-ISC 103

T-ISC 203 Motion Study 3 2 4
Types of methods studies and their applications. Process charts, analysis sheets, time study, work simplification, skill and effort rating.
Prerequisite: None

T-ISC 209 Plant Layout 3 2 4
A practical study of factory planning, with emphasis on the most efficient arrangements of work areas to achieve lower manufacturing costs. Layouts for small and medium-sized plants, layout fundamentals, selection of production equipment and materials handling equipment. Effective management of men, money and materials in a manufacturing operation.
Prerequisite: Consent of advisor

T-ISC 217 Vibration and Noise Control 2 2 3
Study of physics of vibration and sound. Physiological and psychological response to noise. Use of noise monitoring equipment. Engineering control of and personal protection from vibration and noise.
Prerequisite: T-PHY 118

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*Refer to electives suggested in this guide.

T-MEC 111 Manufacturing Processes 3 3* 4
A survey of manufacturing processes, machines, and materials with regard to their capabilities, capacities, tolerances, finishes, etc. Product design, materials utilized, engineering nomenclature, and common terminology will be discussed. Laboratory to include field trips to various manufacturing industries, demonstration of machine operations, and experience in operating machines.
Prerequisite: None

T-MEC 202 Production Methods 3 0 3
The preparation for production: planning, operation sheets, routing, scheduling, control forms and reports. Including an introduction to time and motion study, industrial safety, and quality control.
Prerequisites: T-DFT 102, T-MEC 101 (or T-MEC 111.)

T-CIV 223 Codes, Contracts and Specifications 2 0 2
Basic principles and methods most significant in contract relationships; appreciation of the legal considerations in construction work; study of the National Building Code and local building codes, interpreting and outlining specification.
Prerequisite: None

T-BUS 120 Accounting 5 2 6
Principles, techniques and tools of accounting, for understanding of the mechanics of accounting - collecting, summarizing, analyzing, and reporting information about service and merchantile enterprises including practical application of the principles learned.
Prerequisite: T-MAT 110

T-BUS 272 Principles of Supervision 3 0 3
Introduces the basic responsibilities and duties of the supervisor and his relationship to superiors, subordinates, and associates. Emphasis on securing an effective work force and the role of the supervisor. Methods of supervision are stressed.
Prerequisite: None

T-BUS 123 Business Finance 3 0 3
Financing of business units as individuals, partnerships, corporations, and trusts. A detailed study is made of short-term, long-term, and consumer financing.
Prerequisite: None

T-CHM 105 Chemistry 4 2 5
General course in inorganic chemistry. Properties of acids, salts, bases, and solutions. Chemical and physical properties of selected inorganic elements are studied in detail. Laboratory work will consist of various inorganic tests and experiments.
Prerequisite: T-CHM 101

SOCIAL SCIENCE ELECTIVES

T-SSC 201 Social Science 3 0 3
An integrated course in the social sciences, drawing from the fields of anthropology, psychology, history, and sociology.
Prerequisite: None.

T-SSC 202 Social Science 3 0 3
A further study of social sciences, with emphasis on economics, political science, and social problems as they relate to the individual.
Prerequisite: T-SSC 201.

T-PSY 206 Applied Psychology 3 0 3
A study of the principles of psychology that will be of assistance in the understanding of interpersonal relations on the job. Motivation, feelings and emotions are considered with particular reference to on-the-job problems. Other topics investigated are: employee selection, supervision, job satisfaction, and industrial conflicts. Attention is also given to personal and group dynamics so that the student may learn to apply the principles of mental hygiene to his adjustment problems as a worker and a member of the general community.
Prerequisite: None.

T-SSC 205 American Institutions 3 0 3
A study of the effect of American social, economic, and political institutions upon the individual as a citizen and as a worker. The course dwells upon current local, national, and global problems viewed in the light of our political and economic heritage.
Prerequisite: None.

T-POL 201 United States Government 3 0 3
A study of government, with emphasis on basic concepts, structure, powers, procedures and problems.
Prerequisite: None.

T-ECO 104 Economics 3 0 3
Greater depth in principles of economics, including a penetration into the composition and pricing of national output, distribution of income, international trade and finance, and current economic problems.
Prerequisite: T-ECO 102.

T-ECO 108 Consumer Economics 3 0 3
Designed to help the student use his resources of time, energy, and money to get the most out of life. It gives the student an opportunity to build useful skills in buying, managing his finances, increasing his resources, and to understand better the economy in which he lives.
Prerequisite: None.

T-ECO 201 Labor Economics and Labor Relations 3 2 4

Emphasis is placed on the history of the labor movement in the United States, the development of methods and strategies by labor organizations and by management, the shift in the means of public control; and the factors of income and economic security.
Prerequisite: T-ECO 104.

COURSE INFORMATION

T-ENG 101

GRAMMAR - A course designed to aid the student in the improvement of self-expression in grammar. The approach is functional with emphasis on grammar, diction, sentence structure, punctuation, and spelling. Intended to stimulate students in applying the basic principles of English grammar in their day-to-day situations in industry and social life.

PREREQUISITE: None

	Class Hours	Lab Hours	Credit Hours
	3	0	3

MAJOR DIVISIONS:

I. Words: grammatical usage

II. Language Structure

III. Nouns

IV. Verbs

V. Pronouns

VI. Adjectives and Adverbs

VII. Prepositions and Conjunctions

VIII. Punctuation

IX. Writing Craft

SUGGESTED TEXTS:

Aurner, Robert R. Practical Business English for Colleges. South-Western Publishing Company, 1960.

Hodges, John C. Harbrace College Handbook. Harcourt, Brace and World, Inc., 1962.

Myers, L. M. Guide to American English. Prentice-Hall, Inc., 1963.

Shaffer, Virginia, and Shaw, Harry. Handbook of English. McGraw-Hill Book Company, Inc., 1960.

Stewart, Marie M., Lanham, Frank W., and Zimmer, Kenneth. College English and Communications. McGraw-Hill Book Company, Inc., 1964.

Young, Charles E., Symonik, Emit T. Practical English. McGraw-Hill Book Company, Inc., 1958.

SUGGESTED REFERENCES:

Aurner, Robert R. Effective Communication in Business. South-Western Publishing Company, 1960.

Bailey, Matilda, and Horn, Gunnar. English Handbook. The American Book Company, 1960.

Howell, A. C. A Handbook of English in Engineering Usage. John Wiley and Sons, Inc., 1959.

Shuman, John T. English for Vocational and Technical School. The Ronald Press, 1954.

T-ISC 101

INTRODUCTION TO OCCUPATIONAL SAFETY AND HEALTH - An introduction to the principles of occupational safety and health and the hazards faced by persons employed in industrial plants. A survey course covering record-keeping requirements, first aid, and the keyman development preparing potential management and supervisory personnel for certificates in these areas.

PREREQUISITE:

	Class Hours	Lab Hours	Credit Hours
	3	0	3

MAJOR DIVISIONS:

I. Orientation and History

II. Illness and Injury

III. Loss Prevention Program

IV. Record-keeping Requirements

V. First Aid

VI. Keyman Development

SUGGESTED TEXT:

Selected Codes, Standards and Safety Manuals

"Occupational Safety and Health Act"

Accident Prevention Manual for Industrial Operations. Chicago: National Safety Council. 1967

DeReamer, R. Modern Safety Practices.

SUGGESTED REFERENCES:

Fletcher and Douglas. Total Environmental Control.

Simonds and Grimaldi. Safety Management.

Gilmore. Accident Prevention and Loss Control.

T-ISC 103

SAFETY PROGRAM MANAGEMENT - Course to examine and define the structure of a typical industrial concern and the safety organization and its planning and budgeting process. To develop ability to plan and organize programs suitable for various types of facilities.

PREREQUISITE:

	Class Hours	Lab Hours	Credit Hours
	3	0	3

MAJOR DIVISIONS:

I. The Modern Organization

II. Safety and Loss Control Organization

III. Safety, Industrial Hygiene, and Occupational Nursing

IV. Elements of a Safety Program

V. Risk Management and Workman's Compensation

VI. Resources for the Safety and Health Technician

SUGGESTED TEXTS:

Accident Prevention Manual for Industrial Operations. Chicago: National Safety Council.

Davis, Ralph C. Fundamentals of Top Management. Harper & Row.

SUGGESTED REFERENCES:

Gilmore, Chas. L. Accident Prevention and Loss Control.

PRINCIPLES OF INDUSTRIAL MANAGEMENT - A study in depth of the organizational and functional aspects of line and line-staff organizations, with emphasis on relationships, delegation of authority and assigned responsibilities. Specific emphasis is placed on line-staff relationships, functional authority, methods of control, problem solving, and the establishment of management goals and controls. Each student will be required to develop an organizational structure (under a single manager concept) for a hypothetical business of their choosing.

PREREQUISITE: None.

	Class Hours	Lab Hours	Credit Hours
	5	0	5

MAJOR DIVISIONS:

I. Introduction to Principles of Industrial Management

II. Single Manager

III. Partnership

IV. Corporation

V. The Corporate Structure

VI. Basic Organizational Patterns

VII. The Line Staff Concept

VIII. Functional Authority

IX. Functional Division

X. Organizal Types (Give Examples)

XI. Functions within the Organization

SUGGESTED TEXT:

Longenecker, Justing. Principles of Management and Organization. Ohio, Charles E. Merril Publishing Company, 1969.

SUGGESTED REFERENCES:

Henderson, Herman B. and Haas, Albert E. Industrial Organization and Management Fundamentals. New York: The Industrial Press, 1961.

Bethel, Lawrence L.; Atwater, Franklin S.; Smith, George H.; and Stackman, Harvey A. Essentials of Industrial Management. New York: McGraw-Hill Book Company, Inc., 1956.

Finlay, William W.; Sartain, A. Q.; Tate, Willis M. Human Behavior in Industry. New York: McGraw-Hill Book Company, Inc., 1955.

Yoder, Dale. Personnel Management and Industrial Relations; Fourth Edition. Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1956.

SUGGESTED TEACHING METHODS:

Lecture, Discussions, "Brain-storming", Guest Speakers, Special Projects.

TECHNICAL MATHEMATICS - A real number system developed as an extension of natural numbers. Number system of various bases are introduced. Fundamental algebraic operations, the rectangular coordinate system, as well as fundamental trigonometric concepts and operations are introduced. The application of these principles to practical problems is stressed.

PREREQUISITE: Satisfactory evidence that admission requirements have been met.

	Class Hours	Lab Hours	Credit Hours
MAJOR DIVISIONS:	5	0	5

I. Number Systems as Sets of Numbers

II. Introduction to the Slide Rule

III. Algebraic Expressions and Operations

IV. Linear Functions-Equalities and Inequalities

V. Correspondence Between-Algebra and Geometry

VI. Trigonometry of Right Triangles

VII. Computations Involving Right Triangle Trigonometry

VIII. Exponents and Radicals

IX. Determinants

SUGGESTED TEXTS:

Juszli, Frank L. and Rodger, Charles A. Elementary Technical Mathematics. Prentice-Hall, Inc., 1962.

OR

Rice, Harold S. and Knight, Raymond M. Technical Mathematics. McGraw-Hill Book Company, Inc., 1954.

Washington, Allyn J. Basic Technical Mathematics. Addison-Wesley Publishing Company, Inc., 1964.

SUGGESTED REFERENCES:

Brumfiel, Charles F., Eichoiz, Robert E., and Shanks, Merrill E. Algebra I. Addison-Wesley Publishing Company, Inc., 1962.

Brumfiel, Charles F., Eicholz, Robert E., and Shanks, Merrill E. Algebra II. Addison-Wesley Publishing Company, Inc., 1962.

Elliott, W. W., Miles, Edward, R. C., and Reynolds, Thomas D. Mathematics: Advanced Courses. Prentice-Hall, Inc.

Herberg and Bristol. Elementary Mathematical Analysis. D. C. Heath and Company, 1962.

Kline, William E., Oesterle, Robert and Willson, Leroy M. Foundations of Advanced Mathematics. American Book Company, 1959.

Tuites, Clarence E. Basic Mathematics for Technical Courses. Prentice-Hall, Inc.

T-ENG 102

COMPOSITION - Designed to aid the student in the improvement of self-expression in business and technical composition. Emphasis is on the sentence, paragraph and whole composition.

PREREQUISITE: T-ENG 101

	Class Hours	Lab Hours	Credit Hours
	3	0	3

MAJOR DIVISIONS:

I. The Sentence

II. The Paragraph

III. The Business Letter

IV. The Whole Composition

SUGGESTED TEXTS:

Aurner, Robert R. Practical Business English for Colleges. South-Western Publishing Company, 1960.

Brennan, Maynard J. O.S.B. Compact Handbook of College Composition. D. C. Heath and Company.

Stewart, Marie M., Lanham, Frank W., and Zimmer, Kenneth. College English and Communication. McGraw-Hill Book Company, Inc., 1964.

Young, Charles E., Symonik, Emil I. Practical English. McGraw-Hill Book Company, Inc., 1958.

SUGGESTED REFERENCES:

Aurner, Robert R. Effective Communication in Business. South-Western Publishing Company, 1960.

Bailey, Matilda, and Horn, Gunner. English Handbook. The American Book Company, 1960.

Howell, A. C. A Handbook of English in Engineering Usage. John Wiley and Sons, Inc., 1959.

Shuman, John T. English for Vocational and Technical School. The Ronald Press, 1954.

Shurter, Robert. Effective Letters in Business. McGraw-Hill Book Company, Inc.

HAZARD IDENTIFICATION AND CONTROL - An examination of hazards in the work environment and methods of control. Noise abatement, eye protection and other prevalent hazards will be studied in reference to regulatory standards. Preventative design, layout and planning considerations will be introduced.

PREREQUISITE:

Class Hours	Lab Hours	Credit Hours
3	2	4

MAJOR DIVISIONS:

I. Fundamentals of Systems Safety

II. Human Factors

III. Noise Monitoring

IV. Noise Abatement

V. Eye Protection

VI. Color Coding

VII. Planning Considerations

VIII. Principles of Guarding

IX. General Safety Considerations

SUGGESTED TEXT:

Accident Prevention Manual for Industrial Operations. National Safety Council. 1967.

SUGGESTED REFERENCES:

Gilmore, Charles L. Accident Prevention and Loss Control. American Management Association.

Fletcher and Douglas. Total Environment Control. Toronto, Canada: National Profile Ltd.

Supervisor's Safety Manual. National Safety Council.

T-FIP 115

FIRE PREVENTION PROGRAMS - Principles and applications of fire prevention related to the community and industrial plants. The development and maintenance of fire prevention programs, educational programs, and inspection programs. Specific applications of related disciplines to fire prevention problems.

PREREQUISITE: T-FIP 110.

	Class Hours	Lab Hours	Credit Hours
	3	0	3

MAJOR DIVISIONS:

I. Introduction

II. Developing Fire Prevention Ideas - Programs

III. Written Material

IV. Verbal Material

V. Static Displays

VI. Demonstrations

VII. Fire Prevention Week

SUGGESTED REFERENCES:

Cutlip, S. M. and Center, A. H. Effective Public Relations. Englewood Cliffs, New Jersey: Prentice-Hall, Inc.

Dietrich, Harry F., M.D. Teaching Children Fire Prevention. Boston, Mass.: National Fire Protection Association. Quarterly reprint, July, 1963.

Fire Prevention Pamphlets (35). Boston, Mass.: National Fire Protection Association.

Fire Prevention in Secondary Schools. New York City, New York: Developed by the University of Southern California and available from the International Association of Fire Chiefs.

Firemen's Responsibility in Public Relations. Boston, Massachusetts: National Fire Protection Association, 1950.

Lesly, Philip. Public Relations Handbook. Englewood, New Jersey: Prentice-Hall, Inc., 1962.

Making Household Fabrics Flame Resistant. Washington, D.C.: United States Department of Agriculture. Leaflet No. 545.

Speaker's Guide on Fire Prevention. Chicago, Illinois: Western Actuarial Bureau.

Tested Activities for Fire Prevention Committees. Chicago, Illinois: Federation of Mutual Fire Insurance Companies.

Tryon, George H. Fire Protection Handbook. Boston, Massachusetts: National Fire Protection Association, 1962.

Woolley, Roi. B. Home Fire Safety. New York: International Association of Fire Chiefs, 1967.

Your Fire Department - How It Fights Fire. Boston, Massachusetts: National Fire Protection Association, 1962.

POSSIBLE FILMS:

Help Prevent Fires. 12 min., 16mm. National Fire Protection Association, 60 Batterymarch Street, Boston, Massachusetts. Shows homes before and after fires caused by hazards covered in the film. 1960.

The Nature of Fire. 19 min., 16mm. National Fire Protection Association, 60 Batterymarch Street, Boston, Massachusetts. Film for use in Fire Prevention Programs on the characteristics of fire, methods of extinguishing small fires, and fire prevention. 1966.

Read the Label...and Live. 8 1/2 min., 16mm. National Fire Protection Association, 60 Batterymarch Street, Boston, Massachusetts. Film for use in Fire Prevention Programs on encouraging people to read the label before using products in aerosol cans, and what can happen if they do not follow directions. 1967.

Too Young to Burn. Motion Talking Picture Service, Chicago, Illinois. Good for parents of pre-school children. Deals with ways to teach fire-safety to the very young child.

Your Clothing Can Burn. 12 min., 16mm. National Fire Protection Association, 60 Batterymarch Street, Boston, Massachusetts. For use in programs where safety of clothing needs to be stressed.

T-DFT 118

DRAFTING AND BLUEPRINT INTERPRETATION - Basic drafting techniques are covered to provide a working knowledge of drafting as a tool for communicating ideas. Reading and interpreting of blueprints is emphasized.

PREREQUISITE: None.

	Class Hours	Lab Hours	Credit Hours
MAJOR DIVISIONS:	0	6	2

I. Introduction to Drafting

II. Scales

III. Lettering

IV. Procedure for Reading Scales

V. Applied Geometry: Sketching

VI. Sketching

VII. Orthographic Theory

VIII. Dimensions and Notes

IX. Introduction to Blueprint Reading

X. Representation of Dimensions and Finish

XI. Pictorial Drawing

XII. Working Drawings: Procedure and Techniques

SUGGESTED TEXTS:

French, Thomas E., and Vierck, Charles J. A Manual of Engineering Drawing for Students and Draftsmen; Latest Edition. New York: McGraw-Hill Book Company, Inc.

Giesecke, Frederick E., Mitchell, Alva, and Spencer, Henry Cecil. Technical Drawing; Latest Edition. New York: The MacMillan Company.

Bellis, Herber and Schmidt, Walter A. Blueprint Reading for the Construction Trade; McGraw-Hill Book Company, Inc., 1968.

T-CHM 101

CHEMISTRY - Study of the physical and chemical properties of substances, chemical changes; elements, compounds, gases, chemical combinations; weights and measurements; theory of metals; acids, bases, salts, solvents, solutions, and emulsions. In addition, study of carbohydrates; electrochemistry, electrolytes, and electrolysis in their application of chemistry to industry.

PREREQUISITE: T-MAT 101

	Class Hours	Lab Hours	Credit Hours
	4	2	5

MAJOR DIVISIONS:

I. History and Development of Chemistry

II. Development of the "Scientific Approach"

III. Properties of Matter

IV. Changes in Matter

V. Kinds of Matter

VI. Atomic Theory

VII. Classification of the Elements.

VIII. Formulas and Equations

IX. Acids

X. Bases

XI. Salts

XII. Solutions

XIII. Introduction to Organic Chemistry

SUGGESTED TEXTS:

Arthur and Castra. Chemistry for Today; Latest Edition. New York: Cambridge Book Co.

Dull, Metcafte, and Williams. Modern Chemistry; Latest Edition. New York: Holt, Rinehart, & Winston, Inc.

T-ENG 103

REPORT WRITING - The fundamentals of English are utilized as a background for the organization and techniques of modern report writing. Exercises in developing typical reports, using writing techniques and graphic devices are completed by the students. Practical application in the preparation of a full-length report is required of each student at the end of the term. This report must have to do with something in his chosen curriculum.

PREREQUISITE: T-ENG 102

	Class Hours	Lab Hours	Credit Hours
	3	0	3

MAJOR DIVISIONS

I. Introduction to Report Writing

II. Description and Types of Report Writing

III. Composition of Reports

IV. Organizing Information for a Report

V. Editing and Proofreading

VI. Writing Style and the Way it Affects the Effectiveness of the Report

VII. The Final Formal Report

VIII. The Abstract: the Concise Summary of the Report

SUGGESTED TEXTS:

Effective Business Report Writing; Brown, Leland. Prentice-Hall Inc., 1963.

Technical Communications; Harwell, George C. MacMillan Company, Inc., 1960.

Modern Technical Writing; Sherman, Theodore A. Prentice-Hall, Inc., 1955.

Creative Report Writing; Sklare, Arnold B. McGraw-Hill Book Company, Inc., 1964.

Technical Reporting; Ulman, Joseph N., Jr. and Gould, Jay R. Holt-Rinehart and Winston, 1959.

SUGGESTED REFERENCES:

Practical Business English for Colleges; Aurner, Robert R. South-Western Publishing Company, Inc., 1960.

Report Writing; Caum, Carl G., Graves, Harold F., and Hoffman, Lyne S. S. Prentice-Hall, Inc., 1950.

How You Can Get A Better Job; Lasher, Willard K. and Richards, Edward A. American Technical Society, 1954.

Writing A Technical Paper; Menzel, Donald H., Jones, H. M., and Boyd, L. G. McGraw-Hill Book Company, Inc., 1961.

T-ISC 112

PHYSICAL HAZARDS CONTROL - Study of physical hazards and their control in the work environment. Study of common physical hazards in industry and the appropriate corrective measures to remove these hazards.

PREREQUISITE:

	Class Hours	Lab Hours	Credit Hours
	3	2	4

MAJOR DIVISIONS:

I. Accident Investigation

II. Electrical Safety Principles

III. Materials Handling and Traffic Safety

IV. Production/Fabrication Safety

V. Chemical Safety

VI. Process and Pressure Safety

VII. Personal Protective Equipment

VIII. Inspection Techniques

IX. Accident Analysis

SUGGESTED TEXT:

Accident Prevention Manual for Industrial Operations. National Safety Council. 1967.

SUGGESTED REFERENCES:

Patty, Frank A. Industrial Hygiene and Toxicology, Vol I and II.

Fundamentals of Industrial Hygiene. National Safety Council.

Mayers, May R. Occupational Health: Hazards of the Work Environment.

T-BIO 101

HUMAN ANATOMY AND PHYSIOLOGY - A study of the organizational plan of the human body and of the body systems concerned with motor activities, control and integration of functions, and reproduction. Laboratory experiences provide opportunities to see animal specimens illustrative of systems being studied.

PREREQUISITE:

Class Hours	Lab Hours	Credit Hours
4	2	5

MAJOR DIVISIONS:

I. Basic Concepts of Human Physiology

II. Bones of the Human Body

III. Muscle Physiology

IV. Muscles of the Human Body

V. Nervous System

VI. Central Nervous System

VII. Mouth

VIII. Stomach

IX. The Intestines

X. Respiratory Structures

XI. Gas Exchange

XII. Internal Transport

XIII. The Kidneys

SUGGESTED TEXT:

Morrison, Thomas F., Frederick D. Cornett, J. Edward Tether, and Pauline Gratz. Human Physiology. New York, Toronto, London: Holt, Rinehart, and Winston, Inc.

SUGGESTED REFERENCES:

Arey, Leslie. Developmental Anatomy. W. B. Saunders and Company.

Carlson, Anton J. The Machinery of the Body. University of Chicago Press.

PHYSICS - Aspects of static and dynamic forces. Basics of work, energy, and power. Mechanical properties of liquids, solids, and gases. Principles and formula applicable to fishing situations are stressed.

PREREQUISITE: T-MAT 105.

	Class Hours	Lab Hours	Credit Hours
	3	2	4

MAJOR DIVISIONS:

I. Measurements

II. Force

III. Machines

IV. Motion - Acceleration

V. Behavioral Properties of Matter

VI. Work - Energy - Power

VII. Engines

VIII. Temperature

IX. Wave Motion - Sound

X. Wave Motion - Light

XI. Current Electricity - Direct

XII. Electromagnetism

XIII. Static Electricity

XIV. Natural Radioactivity - Optional

SUGGESTED TEXTS:

Beiser, Arthur. The Mainstream of Physics. Reading, Mass.: Addison-Wesley Publishing Co.

Krauskopf, Konrad B., Arthur Beiser. Introduction to Physics and Chemistry. New York: McGraw-Hill, Inc.

Miller, Franklin, Jr. College Physics. Second Edition. New York: Harcourt, Brace and World, Inc.

Van Mane, F. W., Jr. Elementary Physics. Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1966.

T-ELC 106

ELECTRICAL SAFETY - Requirements and procedures encountered in utility operations, business, and household electrical safety. Electrical concepts including voltage current, resistance, capacitance, and inductance as related to practical circuit applications. Reading and interpreting electrical symbols, schematics, and National Code. Use of electronic measuring devices.

PREREQUISITE:

	Class Hours	Lab Hours	Credit Hours
MAJOR DIVISIONS:	1	3	2

I. Electrical Generation, Transmission, Distribution, and Utilization

II. Basic Electrical Concepts

III. National Electric Code

IV. Testing Electrical Equipment and Appliances

V. Electrical and Electronic Instrumentation

VI. Facilities/Equipment Planning and Layout

VII. Schematics and Symbols

SUGGESTED TEXT:

Selected Standards and Codes.

ORAL COMMUNICATION - A study of basic concepts and principles of oral communications to enable the student to communicate with others. Emphasis is placed on the speaker's attitude, improving diction and voice, and the application of particular techniques of theory to correct speaking habits and to produce effective oral presentation. Particular attention given to conducting meetings, conferences and interviews.

PREREQUISITE: T-ENG 101

	Class Hours	Lab Hours	Credit Hours
MAJOR DIVISIONS:	3	0	3

I. Effective Oral Communication

II. Organization of Oral Communication

III. Ways of Making Speech Convincing

IV. Physical and Vocal Delivery

V. Developing Skills in Different Speech Situations

SUGGESTED TEXTS:

Dietrich, John E. and Brooks, Keith. Practical Speaking for the Technical Man. Prentice-Hall, Inc., 1958.

Henning, James H. Improving Oral Communications. McGraw-Hill Book Company, Inc., 1966.

Phillips, David C. Oral Communication in Business. McGraw-Hill Book Company, Inc., 1955.

Sandford, William P. and Yeager, Willard H. Effective Business Speech. McGraw-Hill Book Company, Inc., 1960.

Soper, Paul A. Basic Public Speaking. Oxford University Press, 1963.

Weiss, Harold and McGrath, James B. Technically Speaking. McGraw-Hill Book Company, Inc., 1963.

SUGGESTED REFERENCES:

Stewart, Marie; Lanham, Frank W. and Zimmer, Kenneth. College English and Communication. McGraw-Hill Book Company, Inc., 1964.

T-MAT 211

BASIC STATISTICS - An introduction to basic concepts of statistics including point and interval estimates; chi-squares; frequency distribution; ratios, rates and percentages. Normal distribution, mean and standard deviation, interval estimates, t-distribution, and coefficient of variation are covered.

PREREQUISITE: None.

	Class Hours	Lab Hours	Credit Hours
	3	0	3

MAJOR DIVISIONS:

I. Introduction

II. Basics in Statistics

III. Fishery Statistics

SUGGESTED REFERENCES:

Rounsefell, G. A. & W. H. Everhart. 1953. Fishery Science. John Wiley & Sons, Inc. New York.

Snedecon, G. W. 1956. Statistical Methods. Iowa State.

CHEMISTRY OF HAZARDOUS MATERIALS - Theories of combustion and extinguishment, including the analysis of flammable materials and the nature of extinguishing agents. The properties of matter affecting fire behavior. The application of the laws and principles of chemistry and physics to the use, storage, and disposal of flammable solids, liquids, gases, and dusts.

PREREQUISITE: T-CHM 101.

	Class Hours	Lab Hours	Credit Hours
	3	2	4

MAJOR DIVISIONS:

I. Combustion

II. Basic Organic Chemistry

III. Temperature, Heat and Energy Sources

IV. Products of Combustion

V. Natural Laws and Properties in Relation to Fire

VI. Fire Extinguishment Methods

VII. Extinguishing Agents

VIII. Flammable Dusts

IX. Plastics

SUGGESTED TESTS:

Dorin, Henry. Vitalized Chemistry. New York, New York: College Entrance Book Co. 1964.

Guise, Arthur B. and Zeratsky, Edward D. Fire Extinguishing Agents and Their Application. Marinette, Wisconsin: The Ansul Company. 1965. Free.

Haessler, Walter M. The Extinguishment of Fire. Dayton, Ohio: The Fyr-Fyter Co. 1962. $1.00.

Tryon, George H. Fire Protection Handbook. Boston, Mass.: National Fire Protection Association. 1962.

SUGGESTED REFERENCES:

Armistead, George, Jr. Safety in Petroleum and Related Industries. New York: John G. Simmons and Co., Inc.

Chemicals for Forest Fire Fighting. Boston, Mass.: National Fire Protection Association.

Dust Explosions. Boston, Mass.: National Fire Protection Association.

Fire Hazards of the Plastic Industry. N. B. F. U. Research Report #1 - M65. New York: American Insurance Association.

Kent, James A. Riegel's Industrial Chemistry. New York: Reinhold Publishing Corp.

Kline, Gordon M. Analytical Chemistry of Polymers. New York: John Wiley and Sons, Inc. 1959.

Kline, Gordon M. Chemical Analysis of Plastics. New York: Interscience Publishers, Inc.

Plastics Engineering Handbook of the Society of the Plastic Industry, Inc. New York: Reinhold Publishing Corp. 1960.

Rochow, E. G. Introduction to Chemistry of the Silicones. New York: John Wiley and Sons, Inc.

Special Interest Bulletins. New York: American Insurance Association.

#281 Fire Problems of Plastic Novelties and Ornaments
#283 Film - Motion Pictures Cellulose Acetate
97 Smoke
#157 Travel of Flammable Vapors
#166 Hydrogen Explosions from the Decomposition of Water Under Fire Conditions
#135 Pyroxylin Lacquer Manufacturing Plants

Technical Data Book on Plastics. Washington: Manufacturing Chemists' Association.

U. S. Bureau of Mines, 4800 Forbes Avenue, Pittsburgh, Pennsylvania.

Laboratory Equipment and Procedures For Evaluating Explosibility of Dusts	R.I. #5624
Recent Studies on the Explosibility of Cornstarch	R.I. #4725
Report of Investigations: Dust Explosions	R.I. #4835 R.I. #4725 R.I. #3924

U. S. Department of Commerce, Clearinghouse for Federal Scientific and Technical Information, Springfield, Virginia. 22151.

Aidun, A. R. and Grove, C. S. Additives to Improve the Fire Fighting Characteristics of Water. AD-285-349P. 1961. $14.00

Friedman, R. and Levy, J. B. Mechanism of Fire Extinguishment by Alkali Metal Salts. AD-260-726P. 1961. $2.60.

Fristrom, R. M. Flame Inhibition Research. AD-285-952P. 1962. $3.60.

Nichols, D. C. Flames and Flame Properties. AD-422-075P. 1963. $3.00.

Skinner, G. B. Survey of Chemical Aspects of Flame Extinguishment. AD-272-122P. 1961. $1.00.

Skinner, G. B. A Research Program for Understanding the Mechanisms of Flame Inhibition. AD-277-028P. 1962. $2.25.

Tuve, R. L. A New Vapor Securing Agent for Flammable Liquid Fire Extinguishment. AD-435-612P. 1964. $1.25.

POSSIBLE FILMS:

Beneath the Flames. 20 min., 16mm. Sacony-Mobil Oil Co. Film Library, 903 W. Grand Blvd., Detroit, Michigan. Controlling large oil tank fires by injection of air at lower portion of tank. 1954. Free

Case of the Smoldering Haymow. 15 min., 16mm. Rent from Iowa State University, Visual Instructions Service, Ames, Iowa. Deals with spontaneous heating of wet hay and what to do about it.

Fire Control. 30 min., 16mm. E. I. DuPont Co., 1007 Market Street, Wilmington, Delaware 19898. Compares fire extinguishment capabilities of freon. 1961. Free.

Operation Fire Control. 14 1/2 min., 16mm. Goodyear Tire and Rubber Co., Audio-Visual Dept., 1144 E. Market St., Akron, Ohio. Fire and extinguishment problems of aluminum alkyis. Preventing reignition. Reactions with air and water. 1963. Free.

The Science of Fire. 20 min., 16mm. American Insurance Association Film Library, East-Broad at Elm, Ridgefield, New Jersey. Story of fire, principles of combustion, flashpoint, ignition temperatures, vapor travel, extinguishing methods. 1961. Free.

HUMAN FACTORS IN SAFETY - Designed to acquaint the student with the physiological and psychological factors that contribute to accident causation. Relationship of motivation and morale to accident prevention. Study of human factors in machine and environmental design and those factors as they influence accident rates.

PREREQUISITE:

	Class Hours	Lab Hours	Credit Hours
	3	3	4

MAJOR DIVISIONS:

I. Theories of Accident Causation

II. Motivating Employees for Safety

III. Human Factors and Plant Design

IV. Supervision and Safety

V. Psychology and Safety

VI. Life Sciences and Safety

VII. Physiology

VIII. Environmental Stresses and Body Responses

IX. Chemical Exposures

X. Design for Human Factors

XI. Man at Work

XII. Plant Layout

SUGGESTED TEXTS:

McCormick, E. J. Human Factors Engineering. New York: McGraw-Hill.

Morgan. Human Factors in Equipment Design.

SUGGESTED REFERENCES:

Chapanis. Research Techniques in Human Engineering.

Woodson. Human Engineering Guide for Equipment Designers.

Bennett, Degan, and Speigel. Human Factors in Technology.

Supervisor's Safety Manual. National Safety Council.

(Industrial Safety and Accident Prevention. MDP #15.)

SAFETY AND HEALTH STANDARDS, CODES, AND REGULATIONS - A review of the important occupational safety and health standards, codes and laws, with particular emphasis on application of these codes to typical work situations. Study of regulatory and insurance agencies and their responsibilities to the occupational safety and health of individuals.

PREREQUISITE:

	Class Hours	Lab Hours	Credit Hours
	3	0	3

MAJOR DIVISIONS:

I. Review of Standards, Codes and Laws

II. State and Federal Regulatory Bodies

III. Safety and Health Standards

IV. Advisory or Consensus Standards

V. Workman's Compensation

SUGGESTED TEXT:

Federal Occupational Safety and Health Standards

National Fire Protection Association Standards and Codes

American National Standards of American National Standards Institute

"Occupational Safety and Health Act of 1970". PL 91-596. December 29, 1970.

ELEMENTS OF INDUSTRIAL HYGIENE - Course designed to develop understanding of broad concepts of industrial hygiene and to develop ability to recognize potentially hazardous environmental conditions. A survey of the effects of toxic agents on the body and general methods of control will be included.

	Class Hours	Lab Hours	Credit Hours
	3	3	4

MAJOR DIVISIONS:

I. Man's Response to Toxic Materials

II. Routes of Entry into Body

III. Threshold Limit Values

IV. Toxic Agents

V. Radiation

VI. Temperatures, Pressure, Noise and Vibration

VII. Noise

VIII. Industrial Ventilation

IX. Other Control Measures

X. Sanitation in the Work Place

XI. Environmental Concerns

SUGGESTED TEXTS:

Fundamentals of Industrial Hygiene. National Safety Council. 1971.

Industrial Environment -- Its Evaluation and Control. Washington, D.C.: U.S. Department of Health, Education and Welfare, Public Health Service.

SUGGESTED REFERENCES:

Patty, Frank A. Industrial Hygiene and Toxicology, Vol. I and II.

Mayers, May R. Occupational Health -- Hazards of the Work Environment.

T-ECO 102

ECONOMICS - The fundamental principles of economics, including the institutions and practices by which people gain a livelihood. Included is a study of the laws of supply and demand and the principles bearing upon production, exchange, distribution, and consumption both in relation to the individual enterprise and to society at large.

PREREQUISITE: None.

	Class Hours	Lab Hours	Credit Hours
	3	0	3

MAJOR DIVISIONS:

I. Elementary Economic Concepts

II. Characteristics of Modern Economic Systems

III. The Size of Business Enterprises

IV. Marketing, Risk, and Transportation

V. Consumption

VI. Individual Prices: Supply and Demand

VII. Money

VIII. Credit and Banking

IX. Price Levels: Changing Value of Money

X. Business Cycles

SUGGESTED TEXTS:

Dodd, J. Harvey, Kennedy, John W., Olsen, Arthur R. Applied Economics; Sixth Edition. Cincinnati, Ohio: South-Western Publishing Co., 1962.

Hailstones, Thomas J. Basic Economics; Second Edition. Cincinnati, Ohio: South-Western Publishing Co., 1964.

James, Clifford L. Principles of Economics; Ninth Edition. New York: Barnes and Noble, Inc., 1954.

SUGGESTED REFERENCES:

Dodd, J. Harvey, Hailstones, Thomas J. Economics, Principles and Applications; Fourth Edition. Cincinnati, Ohio: South-Western Publishing Co., 1962.

Dodd, J. Harvey, Kennedy, John W., Olsen, Arthur R. Workbook for Applied Economics; Sixth Edition. Cincinnati, Ohio: South-Western Publishing Co., 1962.

Erke, Stephen. Economics for Development. Englewood Cliffs: Prentice-Hall, Inc., 1963.

Samuelson, Paul A. Economics: An Introductory Analysis; Fifth Edition. New York: McGraw-Hill Book Company, Inc., 1961.

Smith, Augustus H. Economics for Our Times; Third Edition. New York: McGraw-Hill Book Co., Inc., 1959.

Harviss, C. Lowel. The American Economy: Principles, Practices, and Policies; Fourth Edition. Homewood, Illinois: Richard D. Irwin, Inc., 1962.

T-ISC 225

TECHNIQUES OF INDUSTRIAL HYGIENE - Course designed to develop ability to select and use appropriate field equipment in detecting and monitoring toxic substances under professional guidance.

PREREQUISITE:

MAJOR DIVISIONS:	Class Hours	Lab Hours	Credit Hours
I. Sampling Considerations	3	3	4
II. Use of Instruments			
III. Calibration of Instruments			
IV. Air Contaminants			
V. Air Samplers			
VI. Direct Reading Indicators			
VII. Direct Reading Physical Instrumentation			
VIII. Ventilation Survey Instrumentation			
IX. Noise Evaluation			

SUGGESTED TEXT:

Fundamentals of Industrial Hygiene. National Safety Council. 1971.

Industrial Environment -- Its Evaluation and Control. Washington, D. C.: U. S. Department of Health, Education and Welfare, Public Health Service.

SUGGESTED REFERENCES:

Willard, Merritt, and Dean. Instrumental Methods of Analysis. Vendors Booklets.

Air Sampling Instruments. ACGIH.

T-BUS 235

BUSINESS MANAGEMENT - Principles of business management, including overview of major functions of management, such as planning, staffing, controlling, directing, and financing. Clarification of the decision-making function versus the operating function. Role of management in business--qualifications and requirements.

PREREQUISITE: None

	Class Hours	Lab Hours	Credit Hours
	3	0	3

MAJOR DIVISIONS:

I. Basis of Management

II. Planning

III. Organization

IV. Staffing

V. Direction

VI. Control

SUGGESTED TEXT:

Koontz, Harold and O'Donnell, Cyril. Principles of Managment; Third Edition. New York: McGraw-Hill Book Company, Inc., 1964.

SUGGESTED REFERENCES:

Keith, Lyman A., and Gubellini, Carlo E. Business Management. New York: McGraw-Hill Book Company, Inc., 1958.

Shilt, Bernard A. and Wilson, W. Harmon. Business Principles and Management; Fourth Edition. Cincinnati: South-Western Publishing Company, 1961.

Terry, George R. Principles of Management; Fourth Edition. Homewood: Richard D. Irwin, Inc., 1964.

T-ISC 125

TRAFFIC AND FLEET SAFETY - A basic introduction to problems and practices of motor traffic and fleet safety, with emphasis on the ability to plan and administer a safety program of small fleet or provide assistance in administration of large fleet program. Study of traffic legislations, traffic control, and automotive transportation problems.

PREREQUISITE:

Class Hours	Lab Hours	Credit Hours
3	0	3

MAJOR DIVISIONS:

I. Motor Vehicle Accidents

II. Determining Preventability

III. Accident Reports and Records

IV. Safety as a Loss Prevention Activity

V. The Commercial Motor Fleet

VI. Managing a Fleet Safety Program

VII. Typical Functional Organization

VIII. Driver Selection, Records, and Supervision

IX. Training and Testing Drivers

X. Federal and State Regulations

SUGGESTED TEXT:

Motor Fleet Safety Manual. Chicago: National Safety Council, 1967.

Motor Fleet Safety Supervision. Institute of Public Safety. Pennsylvania State University.

T-ISC 203

MOTION STUDY - Types of methods studies and their applications. Process charts, analysis sheets, time study, work simplification, skill and effort rating.

PREREQUISITE: None.

	Class Hours	Lab Hours	Credit Hours
MAJOR DIVISIONS:	3	2	4

I. Principles, Techniques, Work Measurement

II. Eye Motions and Allied Topics

III. Applications Engineering

IV. Organization and Management

SUGGESTED TEXTS:

Karger, Delmar and Franklin H. Bayha. Engineered Work Measurement. New York: The Industrial Press, 1957.

Up-to-date trade journals and publications should be used continuously in conjunction with the suggested text.

SUGGESTED REFERENCES:

Process Engineering. New York: McGraw-Hill Book Company, Inc., 1960.

Machinery's Handbook. New York: The Industrial Press, 1958.

Maynard, H. B. Industrial Engineering Handbook. New York: McGraw-Hill Book Company, Inc., 1959.

Lansburgh, R. H. Industrial Management. New York: John Wiley and Sons, Inc., 1961.

Industrial Management. New York: The Ronald Press, 1960.

Production Handbook. New York: The Ronald Press, 1960.

PLANT LAYOUT - A practical study of factory planning with emphasis on the most efficient arrangements of work areas to achieve lower manufacturing costs. Layouts for small and medium-sized plants, layout fundamentals, selection of production equipment and materials handling equipment. Effective management of men, money and materials in a manufacturing operation.

PREREQUISITE: Consent of Advisor.

	Class Hours	Lab Hours	Credit Hours
	3	2	4

MAJOR DIVISIONS:

I. The Nature of Plant Layout

II. Factors Influencing Plant Layout

III. How to Plan the Layout

IV. Managing and Training for Layout Work

SUGGESTED TEXT:

Muther, Richard. Practical Plant Layout. New York: McGraw-Hill Book Company, Inc., 1955.

SUGGESTED REFERENCES:

Nordhoff, W. A. Machine-Shop Estimating. New York: McGraw-Hill Book Company, Inc., 1960.

Bethel, Atwater; Smith, Stackman, Jr. Essentials of Industrial Management. New York: McGraw-Hill Book Company, Inc., 1959.

Scheele, Evan D. Principles and Design of Production Control Systems. New Jersey: Prentice-Hall, Inc., 1960.

Ireson, Grant W. Factory Planning and Plant Layout. New Jersey: Prentice-Hall, Inc., 1952.

Immer, John R. Layout Planning Techniques. New York: McGraw-Hill Book Company, Inc., 1950.

VIBRATION AND NOISE CONTROL - Study of physics of vibration and sound. Physiological and psychological response to noise. Use of noise monitoring equipment. Engineering control of and personal protection from vibration and noise.

PREREQUISITE:

	Class Hours	Lab Hours	Credit Hours
	2	2	3

MAJOR DIVISIONS:

I. Introduction to Physics of Vibration and Sound

II. Physiology of Hearing

III. Sound Transmission and Reflection

IV. Noise Measurement Criteria

V. Legislative Requirements

VI. Instrumentation and Monitoring

VII. Engineering Control Methods

VIII. Ear Protection and Hearing Testing

IX. Personal Protective Equipment

X. Community Noise

SUGGESTED TEXT:

Industrial Noise Manual. American Industrial Hygiene Association.

SUGGESTED REFERENCES:

Sound, Noise and Vibration Control. Yerges.

MDP 28. Noise Abatement *and Hearing* Conservation.

T-MEC 111

MANUFACTURING PROCESSES - A survey of manufacturing processes, machines and materials with regard to their capabilities, capacities, tolerances, finishes, etc. Product design, materials utilized, engineering nomenclature, and common terminology will be discussed. Laboratory to include field trips to various manufacturing industries, demonstration of machine operations, and experience in operating machines.

PREREQUISITE: None.

Class Hours	Lab Hours	Credit Hours
3	3	4

MAJOR DIVISIONS:

I. Manufacturing Industries

II. Properties of Materials

III. Manufacturing Operations

IV. Machine Tools

V. Forming and Fabricating Operations

VI. Material Treatment

VII. Products of Manufacturing

SUGGESTED TEXTS:

Carroll, Edgar. Fundamentals of Manufacturing Processes and Materials. Addison-Wesley Publishing Co., Reading, Mass. 1965.

Doyle, Morris, Leach, and Schrader. Manufacturing Processes and Materials for Engineers. Englewood Cliffs: Prentice-Hall, Inc., 1961

SUGGESTED REFERENCES:

Rusinoff, S. E. Manufacturing Processes: Materials and Products. American Technical Society: Chicago. 1962.

Eary, D. F. and Johnson, G. E. Process Engineering for Manufacturing. P-H. 1962.

PRODUCTION METHODS - The preparation for production: planning, operation sheets, routing, scheduling, control forms and reports. Including an introduction to time and motion study, industrial safety, and quality control.

PREREQUISITES: T-DFT 102, T-MEC 101 and T-MEC 111.

	Class Hours	Lab Hours	Credit Hours
	3	0	3

MAJOR DIVISIONS:

I. Industrial Organizations

II. Interrelationships of Industrial Factors

III. Plant Location

IV. Manufacturing Engineering

V. Plant Layout

VI. Materials Handling

VII. Packaging

VIII. Value Engineering

IX. Quality Control

X. Production Planning

XI. Production Control

XII. Purchasing and Inventory Control

XIII. Methods Engineering

XIV. Time Study

XV. Industrial Safety

SUGGESTED TEXT:

Vaughn, Richard C. Introduction to Industrial Engineering. Ames, Iowa State University Press, 1967.

ALTERNATE TEXTS:

Eary and Johnson. Process Engineering. Englewood Cliffs, N.J.: Prentice-Hall, Inc., 1962.

Koepke, Charles A. Plant Production Control. New York: John Wiley and Sons, Inc., 1961.

Text material to be supplemented by subject matter from trade journals and publications.

SUGGESTED REFERENCES:

Biegel, John E. Production Control. Englewood Cliffs, N.J.: Prentice-Hall, Inc., 1963.

Bittel, Melden and Rice. Practical Automation. New York: McGraw-Hill Book Co., Inc., 1957.

Immer, John R. Layout Planning Techniques. New York: McGraw-Hill Book Co., Inc., 1950.

Mayer, Raymond R. Production Management. New York: McGraw-Hill Book Co., Inc. 1962.

Miles, Lawrence D. Techniques of Value Analysis and Engineering. New York: McGraw-Hill Book Co., Inc., 1961.

Plossl and Wright. Production and Inventory Control. Englewood Cliffs, N.J.: Prentice-Hall, Inc., 1967.

Wage, Herbert W. Manufacturing Engineering. New York: McGraw-Hill Book Co., Inc., 1963.

T-CIV 223

CODES, CONTRACTS, AND SPECIFICATIONS - A study of the basic principles and methods most significant in contract relationships; appreciation of the legal considerations in construction work; study of the National Building Code and local building codes; interpreting and outling specifications.

PREREQUISITE: None

MAJOR DIVISIONS:	Class Hours	Lab Hours	Credit Hours
	2	0	2

I. Elements of Contracts

II. Contract Documents

III. Design and Specification Notes

IV. Codes

V. General Code Study

VI. Miscellaneous Equipment

SUGGESTED TEXTS:

Mead, D. W. Contracts Specifications and Engineering Relations. New York: McGraw-Hill Book Co., Inc., 1956.

N. C. Department of Insurance North Carolina State Building Code. Raleigh, North Carolina.

SUGGESTED REFERENCE:

Merritt, Frederick S. Building Construction Handbook. New York: McGraw-Hill Book Co., Inc., 1958.

ACCOUNTING - Principles, techniques and tools of accounting, for understanding of the mechanics of accounting - collecting, summarizing, analyzing, and reporting information about service and mechantile enterprises, including practical application of the principles learned.

PREREQUISITE: T-MAT 110

MAJOR DIVISIONS :	Class Hours	Lab Hours	Credit Hours
	2	0	2

I. Introduction to Bookkeeping and Accounting

II. Accounting Cycle

III. Notes, Prepayments and Accruals

IV. Receivables, Inventory and Fixed Assets

SUGGESTED TEXTS:

Noble, H. S., and Niswonger, C. Rollin. Accounting Principles; Eighth Edition. Cincinnati: South-Western Publishing Co., 1961.

Carson, A. B., Sherwood, J. F., and Boling, Clem. College Accounting; Seventh Edition. Cincinnati: South-Western Publishing Co., 1962.

Carson, A. B., Sherwood, J. F., and Boling, Clem. Secretarial Accounting; Seventh Edition. Cincinnati: South-Western Publishing Co., 1962.

SUGGESTED REFERENCES:

VanVoorhis, Robert H., Palmer, Charles E., and Archer, Fred C. College Accounting Theory and Practice. New York: Gregg Publishing Division, McGraw-Hill Book Co., Inc., 1963.

Meigs, Walter B., and Johnson, Charles E. Accounting. New York: McGraw-Hill Book Co., Inc., 1962.

Workbook and Practice Set for Accounting Principles; Eighth Edition. Cincinnati: South-Western Publishing Co., 1961.

Workbook and Practice Set for College Accounting; Seventh Edition. Cincinnati: South-Western Publishing Co., 1962.

Finney, Harry A., and Miller, Herbert E. Principles of Accounting: Introduction; Fifth Edition. Englewood Cliffs: Prentice-Hall, Inc., 1957.

PRINCIPLES OF SUPERVISION - Introduction of the basic responsibilities and duties of the supervisor and his relationship to superiors, subordinates, and associates. Emphasis on securing an effective work force and the role of the supervisor. Methods of supervision are stressed.

PREREQUISITE: None

	Class Hours	Lab Hours	Credit Hours
	3	0	3

MAJOR DIVISIONS:

I. Point of View

II. The Adjustment of Unique Individuals

III. Work and the Worker

IV. Selection of the Worker

V. Training the Worker

VI. Control of Environment

VII. Supervising People

VIII. Job Satisfaction and Service

SUGGESTED TEXTS:

Bittel, Lester R. What Every Supervisor Should Know. New York: McGraw-Hill Book Company, Inc., 1959.

OR

Kay, Brian R., and Palmer, Stuart. The Challenge of Supervision. New York: McGraw-Hill Book Company, Inc., 1961.

OR

Pfiffner, John M., and Fels, Marshall. The Supervision of Personnel; Third Edition. Englewood Cliffs: Prentice Hall, Inc., 1964.

SUGGESTED REFERENCE:

Ecker, Paul; Macrae, John; and Ouellette, Vernon A. Handbook for Supervisors. Englewood Cliffs: Prentice-Hall, Inc., 1959.

T-BUS 123

BUSINESS FINANCE - A study of the financing of business units, as individuals, partnerships, corporations, and trusts. A detailed study is made of short-term, long-term, and consumer financing.

PREREQUISITE: None

	Class Hours	Lab Hours	Credit Hours
MAJOR DIVISIONS:	3	0	3

I. Nature and Role of Finance in our Economy

II. Review

III. Meeting the Demand for Funds

IV. Financing the Consumer

SUGGESTED TEXTS:

Dauten, Carl A.; Welshans, Merle T. Principles of Finance; Second Edition. Cincinnati: South-Western Publishing Company, 1964.

Dauten, Carl A., Business Finance: The Fundamental of Financial Management; Second Edition. Englewood Cliffs: Prentice-Hall, Inc., 1956.

SUGGESTED REFERENCES:

Cohen, Jerome B.; Hanson, Arthur W. Personal Finance, Principles and Case Problems: Third Edition. Homewood: Richard D. Irwin, Inc., 1964.

Hunt, Pearson; Williams, Charles M. and Donaldson, Gordon. Basic Business Finance; Revised Edition. Homewood: Richard D. Irwin, Inc., 1961.

Howard, Bion; Upton, Miller. Introduction to Business Finance. New York: McGraw-Hill Book Company, 1953.

CHEMISTRY - A general course in inorganic chemistry. Properties of acids, salts, bases, and solutions. Chemical and physical properties of selected inorganic elements are studied in detail. Laboratory work will consist of various inorganic tests and experiments.

PREREQUISITE: T-CHM 101

	Class Hours	Lab Hours	Credit Hours
	4	2	5

MAJOR DIVISIONS:

I. Matter, Elements, and Compounds

II. Gases, Liquids, and Solids

III. Oxygen

IV. Hydrogen

V. Calculations Based on Chemical Equations

VI. The Periodic Table

VII. Atomic Structure

VIII. Nucleus of the Atom

IX. Water

X. Rate of Reaction and Equilibrium in Chemical Reactions

XI. Solutions

XII. Acids, Bases, and Salts

XIII. Ionic Equilibria

XIV. Electrolysis

XV. Halogens

XVI. Sulfur

XVII. Nitrogen

XVIII. Phosphorus

XIX. Oxidation Potentials

XX. Carbon, Carbon Monoxide, and Carbon Dioxide

XXI. Silicon

XXII. Colloids

XXIII. Metals

XXIV. Gold, Silver, Mercury, and Copper

XXV. Lead and Tin

XXVI. Arsenic, Antimony, and Bismuth

XXVII. Zinc and Cadmium

XXVIII. Aluminum and Chromium

XXIX. Manganese, Iron, Cobalt and Nickel

XXX. Alkaline Earth Metals

XXXI. Description and Properties of Some Important Less Familiar Elements

SUGGESTED TEXT:

Sorum, C. H. Fundamentals of General Chemistry. Englewood Cliffs, N.J.: Prentice-Hall, Inc., 1961.

SUGGESTED REFERENCES:

Dull, C. E., Metcalfe, H. C., and Williams, J. E. Modern Chemistry. New York: Holt, Rinehart and Winston, Inc., 1962.

Hart, H. and Schuetz, R. D. Organic Chemistry. New York: Houghton-Mifflin, Co., 1953.

Hildebrand, J. H., Latimer, W. M., and Powell, R. E. Principles of Chemistry and Reference Book of Inorganic Chemistry; Combined Volume. New York: The Macmillan Co., 1952.

Latimer, W. H. Oxidation Potentials; Second Edition. New York: Prentice-Hall, Inc., 1952.

Mack, E., Jr., Garrett, H. B., Haskins, J. F., and Verhoek, F. H. Textbook of Chemistry. New York: Ginn and Co., 1949.

Moeller, T. Inorganic Chemistry. New York: John Wiley & Sons, 1952.

Pauling, L. General Chemistry. San Francisco, California: W. H. Freeman & Co., 1953.

Sneed, M. C., Maynard, J. L., and Brasted, R. C. General College Chemistry. New York: D. Van Nostrand, 1954.

Sorum, C. H. How to Solve General Chemistry Problems. New York: Prentice-Hall, Inc., 1952.

Watt, G. W. and Holmes, J. R. Basic Concepts in Chemistry. New York: McGraw-Hill Book Co., Inc., 1958.

Weaver, E. C. and Foster, L. S. Chemistry of Our Times. New York: McGraw-Hill Book Co., Inc., 1960.

SUGGESTED LABORATORY MANUALS:

Bruce, J. and Harper, H. Practical Chemistry. New York: Macmillan Co. Ltd. London. St. Martin's Press, 1955.

General Chemistry Laboratory Manual; Fourteenth Edition. Raleigh, N. C.: The Chemical Manual Co., Box 5247, State College Station.

Weaver, E. C. and Weaver, E. S. Laboratory Introduction to Chemistry. New York: McGraw-Hill Book Co., Inc., 1960.

T-PSY 206

APPLIED PSYCHOLOGY - A study of the principles of psychology that will be of assistance in the understanding of interpersonal relations on the job. Motivation, feelings and emotions are considered with particular reference to on-the-job problems. Other topics investigated are: employee selection, supervision, job satisfaction, and industrial conflicts. Attention is also given to personal and group dynamics so that the student may learn to apply the principles of mental hygiene to his adjustment problems as a worker and a member of the general community.

PREREQUISITE: None

	Class Hours	Lab Hours	Credit Hours
	3	0	3

MAJOR DIVISIONS:

I. The Study of Psychology

II. Relations with Other People

III. Personal Problems

IV. Group Dynamics

SUGGESTED TEXTS:

Beach, Leslie R. and Clark, Elon L. Psychology in Business. New York: McGraw-Hill Book Company, Inc., 1959.

Bernhardt, Karl S. Practical Psychology; Second Edition. New York: McGraw-Hill Book Company, Inc., 1953.

Laird, Donald A. and Laird, Eleanor. Practical Business Psychology; Third Edition. New York: McGraw-Hill Book Company, Inc., 1961.

SUGGESTED REFERENCES:

Bell, E. H. Social Foundations of Human Behavior; Current Edition. New York: Harper-Row, Inc., 1961.

Hepner, Harry Walker. Psychology Applied to Life and Work; Fourth Edition. Englewood Cliffs: Prentice-Hall, Inc., 1964.

Tiffen, Joseph and McCormick, Ernest I. Industrial Psychology; Fifth Edition. Englewood Cliffs: Prentice-Hall, Inc., 1965.

T-SSC 205

AMERICAN INSTITUTIONS - A study of the effect of American social, economic, and political institutions upon the individual as a citizen and as a worker. The course dwells upon current local, national, and global problems viewed in the light of our political and economic heritage.

PREREQUISITE: None.

	Class Hours	Lab. Hours	Credit Hours
MAJOR DIVISIONS:	3	0	3

T-POL 201

UNITED STATES GOVERNMENT - A study of government, with emphasis on basic concepts, structure, powers, procedures and problems.

PREREQUISITE: None.

MAJOR DIVISIONS:	Class Hours	Lab Hours	Credit Hours
	3	0	3

ECONOMICS - Greater depth in principles of economics, including a penetration into the composition and pricing of national output, distribution of income, international trade and finance, and current economic problems.

PREREQUISITE: T-ECO 102.

	Class Hours	Lab Hours	Credit Hours
	3	0	3

MAJOR DIVISIONS:

I. Distribution of Income

II. Population Problems

III. Agricultural Problems in Relation to Population and Income

IV. Labor Problems

V. Industrial Concentration and Governmental Control

VI. Public Utilities and Governmental Control

VII. International Trade and Finance

VIII. International Economic Problems

SUGGESTED TEXTS:

Hailstones, Thomas J. Basic Economics; Second Edition. Cincinnati, Ohio: South-Western Publishing Co., 1964.

Hailstones, Thomas J., Dodd, J. Harvey. Economics: An Analysis of Principles and Policies; Fifth Edition. Cincinnati: South-Western Publishing Co.

James, Clifford L. Principles of Economics; Ninth Edition. New York: Barnes and Noble, Inc., 1954.

McConnell, Campbell R. Economics: Principles, Problems and Policies; Third Edition. New York: McGraw-Hill Book Company, Inc.

SUGGESTED REFERENCES:

Dodd, J. Harvey, Hailstones, Thomas J. Economics, Principles and Applications; Fourth Edition. Cincinnati, Ohio: South-Western Publishing Co., 1961.

Dodd, J. Harvey, Kennedy, John W., Olsen, Arthur R. Applied Economics; Sixth Edition. Cincinnati, Ohio: South-Western Publishing Co., 1961.

Dodd, J. Harvey, Kennedy, John W., Olsen, Arthur R. Workbook for Applied Economics; Sixth Edition. Cincinnati, Ohio: South-Western Publishing Co., 1962.

Erke, Stephen. Economics for Development. Englewood Cliffs: Prentice-Hall, Inc., 1963.

Harviss, C. Lowel. The American Economy: Principles, Practices, and Policies; Fourth Edition. Homewood, Illinois: Richard D. Irwin, Inc., 1962.

Samuelson, Paul A. Economics: An Introductory Analysis; Fifth Edition. New York: McGraw-Hill Book Company, Inc., 1961.

Smith, Augustus H. Economics for Our Time; Third Edition. New York: McGraw-Hill Book Co., Inc., 1959.

T-ECO 108

CONSUMER ECONOMICS - Designed to help the student with his resources of time, energy, and money to get the most out of life. It gives the student an opportunity to build useful skills in buying, managing his finances, increasing his resources, and to better understand the economy in which he lives.

PREREQUISITE: None.

Class Hours	Lab Hours	Credit Hours
3	0	3

T-ECO 201

LABOR ECONOMICS AND LABOR RELATIONS - Emphasis is placed on the history of the labor movement in the United States, the development of methods and strategies by labor organizations and by management, the shift in the means of public control, and the factors of income and economic security.

PREREQUISITE: T-ECO 104.

	Class Hours	Lab Hours	Credit Hours
MAJOR DIVISIONS:	3	2	4

EQUIPMENT LIST

The equipment list included herein is provided as a guide to the institution initiating an associate degree program in occupational safety and health. It was developed with the aid of the Statewide Occupational Safety and Health Advisory Committee. Only the Occupational Safety and Health Equipment List is included in this manual, although other equipment list are authorized for this curriculum. Up-to-date equipment lists can be requested from the Department of Community Colleges. Institutions should use care in selecting equipment items to support their program. All equipment listed is not necessary to support the average program in occupational safety and health.

Summary of Laboratory Needs and Costs

Laboratory	Authorized Amount
1. Biology-General (No. 22)	$38,420.00
2. Chemistry-General (No. 28)	$26,800.00
3. Physics-Vocational (No. 141)	$13,629.00
4. Occupational Safety and Health (No. 200)	$23,813.00

OCCUPATIONAL SAFETY AND HEALTH EQUIPMENT LIST (NO. 200)
15 Students

Item	Quantity	Description
1	1	Pitot Tube with inclined Manometer
2	1	Velometer, Alnor Jr.
3	1	Velometer & Attachments
4	1	Thermoanemometer
5	3	Magnehelic Gauges (3 ranges)
6	1	Dry Test Meter
7	1	Wet Tester Meter
8	3	Rotameters (3 ranges)
9	3	Stopwatches
10	3	Personal Air Samplers, Complete
11	1	Critical Orifice Kit
12	1	Combustible Gas Indicator, Oxygen Indicator, and Flashlight
13	1	Halide Meter
14	1	Mercury Vapor Detector
15	3	Carbon-Vaned Vacuum Pumps
16	1	Sampling Kit with Selected Indicator Tubes
17	1	Carbon Monoxide Indicator
18	9	Midget Impingers
19	3	Tripod for Field Monitors
20	1	Illumination Meter with Color and Cosine Correction
21	1	Heat Stress Kit with Globe, Wet, & Dry Bulb Thermometers

Item	Quantity	Description
22	1	Binocular Microscope
23	1	Carrying case
24	1	Sound Level Meter
25	1	Sound level meter w/octave band analyzer and import capacity
26	1	Calibrator
27	1	Acoustical and Vibration Unit to include the following instruments: Integrator, Accelerometer set w/Tripod furnished. Sound level meter and octave band analyzer, w/wind screens. Sound level meter, Tape Recorder w/wind screens, Carry-corder, 2 Microphones. A 1 inch and A 1/2 inch random incidence response type w/wind screens. Carrying case to store all components.
28	1	Audiometric, Booth, with Seat and with Silent Ventilation System
29	1	Audiometer
30	1	Mass Respirable Dust Sampler
31	1	Microwave Detector
32	1	Electrobalance for Travimetric Determinations
33	1	Dessicator Cabinet for Electrobalance
34	1	High Volume Air Sampler
35	1	Gas Chromatograph & Appropriate Detectors for OSHA Charcoal Absorption Method of Vapor Sampling
36	10 boxes	Smoke Tubes and Bulbs
37	50	Field Monitors (3 piece)
38	1 box	Filters, 5 micron

Item	Quantity	Description
39	1 box	Back up pads
40	6	Clamps for field monitors
41	1	Tape measure, 12 ft.
42	1	Masking Tape
43	1	Extension Cord
44	10 boxes	Organic Vapor Absorption Tubes for Gas Chromatograph

Total Cost $23,813.00

BIBLIOGRAPHY

OCCUPATIONAL SAFETY

American General Contractors, Inc., Manual of Accident Prevention in Construction, Washington, D. C.: American General Contractors, 1958.

American Management Association, Effective Communication on the Job, New York: American Management Association, 1963.

American National Standards Institute, Standards, New York: American National Standards Institute, various.

American Oil Company, Engineering for Safe Operations, Booklet #8, Chicago: American Oil Company, 1964.

Annett, F. A., Elevators, New York: McGraw-Hill.

Bureau of National Affairs, The Job Safety and Health Act of 1970, Rockville, Maryland: BNA Books, 1971.

Creber, F. L., Safety for Industry, London Royal Society Prevention of Accidents, 1967.

DeReamer, R., Modern Safety Practices, New York: John Wiley and Sons, Inc., 1958.

Fawcett, H. H. and Wood, W. S., Safety and Accident Prevention in Chemical Operations, New York: John Wiley and Sons, 1965.

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SOURCES OF INFORMATION

OCCUPATIONAL SAFETY AND HEATH

National Institute for Occupational Safety and Health
U.S. Department of HEW
1014 Broadway
Cincinnati, Ohio 45202

OCCUPATIONAL SAFETY

American Insurance Association
85 John Street, N.W.
New York, New York 10038

American Mutual Alliance
20 North Wacker Drive
Chicago, Illinois 60606

American National Standards Institute
70 E. 45th Street
New York, New York

American Society of Safety Engineers
850 Busse Highway
Park Ridge, Illinois 60068

Associated General Contractors of America
1957 E. Street, N.W.
Washington, D. C. 20006

California Division of Industrial Safety
455 Golden Gate Avenue
San Francisco, California 94102

Manufacturing Chemists Association
1825 Connecticut Avenue, N.W.
Washington, D. C.

National Safety Council
425 N. Michigan Boulevard
Chicago, Illinois 60611

Occupational Safety and Health Administration
U.S. Department of Labor
Constitution Avenue & 12th Street
Washington, D. C.

OCCUPATIONAL HEALTH

American Conference of Governmental Industrial Hygienists
P. O. Box 1937
Cincinnati, Ohio 45201

American Industrial Hygiene Association
210 Haddon Avenue
Westmont, New Jersey 08108

Industrial Hygiene Foundation
4400 Fifth Avenue
Pittsburgh, Pennsylvania 15213

National Safety Council
425 N. Michigan Boulevard
Chicago, Illinois 60611

Occupational Safety and Health Administration
U.S. Department of Labor
Constitution Avenue & 12th St.
Washington, D. C.

INDUSTRIAL FIRE PROTECTION

American Gas Association
420 Lexington Avenue
New York, New York

American Insurance Association
85 John Street
New York, New York 10038

American National Standards Institute
70 E. 45th Street
New York, New York

Factory Insurance Association
555 Asylum Street
Hartford, Connecticut 06005

Federal Fire Council
F and 18th Street, N.W.
Washington, D. C. 20006

Manufacturing Chemists Association
1825 Connecticut Avenue
Washington, D. C. 20009

National Fire Protection Association
60 Battery March Street
Boston, Massachusetts 02110

MOTOR FLEET SAFETY

American Trucking Association, Inc.
1616 P Street, N.W.
Washington, D. C. 20036

Institute for Public Safety
Pennsylvania State University
University Park, Pennsylvania

Insurance Institute for Highway Safety
Washington, D. C.

National Safety Council
425 N. Michigan Boulevard
Chicago, Illinois 60611

Northwestern University Traffic
Institute
1812 N. Hinman Avenue
Evanston, Illinois