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)
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, President
Department of Community Colleges
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
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Raleigh, NC

Ray Boylston, OSHA Director
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High Point, NC

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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 waive 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.
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 hygiene 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 workplace. 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
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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.

<table>
<thead>
<tr>
<th>Basic Courses</th>
<th>Class</th>
<th>Lab</th>
<th>Credit</th>
<th>Contact</th>
</tr>
</thead>
<tbody>
<tr>
<td>T-ISC 101  Introduction to Occupational Safety and Health</td>
<td>3</td>
<td>0</td>
<td>3</td>
<td>33</td>
</tr>
<tr>
<td>T-ISC 103  Safety Program Management</td>
<td>3</td>
<td>0</td>
<td>3</td>
<td>33</td>
</tr>
<tr>
<td>T-ISC 111  Hazard Identification and Control</td>
<td>3</td>
<td>2</td>
<td>4</td>
<td>55</td>
</tr>
<tr>
<td>T-ISC 112  Physical Hazards Control</td>
<td>3</td>
<td>2</td>
<td>4</td>
<td>55</td>
</tr>
<tr>
<td>T-ISC 224  Elements of Industrial Hygiene</td>
<td>3</td>
<td>3</td>
<td>4</td>
<td>66</td>
</tr>
<tr>
<td>T-FIP 115  Fire Prevention Programs</td>
<td>3</td>
<td>0</td>
<td>3</td>
<td>33</td>
</tr>
</tbody>
</table>

And at least two additional courses selected from the following:

<table>
<thead>
<tr>
<th>Basic Courses</th>
<th>Class</th>
<th>Lab</th>
<th>Credit</th>
<th>Contact</th>
</tr>
</thead>
<tbody>
<tr>
<td>T-ISC 104  Safety and Health Standards, Codes and Regulations</td>
<td>3</td>
<td>0</td>
<td>3</td>
<td>33</td>
</tr>
<tr>
<td>T-ISC 120  Principles of Industrial Management</td>
<td>3</td>
<td>2</td>
<td>4</td>
<td>55</td>
</tr>
<tr>
<td>T-ISC 125  Traffic and Fleet Safety</td>
<td>3</td>
<td>0</td>
<td>3</td>
<td>33</td>
</tr>
<tr>
<td>T-ISC 124  Human Factors in Safety</td>
<td>3</td>
<td>3</td>
<td>4</td>
<td>66</td>
</tr>
<tr>
<td>T-ISC 225  Techniques of Industrial Hygiene</td>
<td>3</td>
<td>3</td>
<td>4</td>
<td>66</td>
</tr>
<tr>
<td>T-CHM 101  Chemistry</td>
<td>3</td>
<td>3</td>
<td>4</td>
<td>66</td>
</tr>
<tr>
<td>T-FIP 218  Chemistry of Hazardous Materials</td>
<td>3</td>
<td>2</td>
<td>4</td>
<td>55</td>
</tr>
<tr>
<td>T-BIO 101  Human Anatomy and Physiology</td>
<td>3</td>
<td>3</td>
<td>4</td>
<td>66</td>
</tr>
</tbody>
</table>

Total Contact Hours (minimum) 385
## SUGGESTED CURRICULUM BY QUARTERS

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

<table>
<thead>
<tr>
<th>Class</th>
<th>Lab.</th>
<th>Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Social Science Elective</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>T-ISC 226 &amp; TA</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>T-BUS 240 &amp; TA</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Technical Elective</td>
<td>9</td>
<td>3</td>
</tr>
</tbody>
</table>

Total Quarter Hours in Courses: 90
Electives: 18
Total: 108

*Refer to Electives suggested in this guide.*
## FIRST QUARTER

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Hours Per Week</th>
<th>Quarter Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>T-ENG 101</td>
<td>Grammar</td>
<td>3 0</td>
<td>3</td>
</tr>
</tbody>
</table>

**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

13
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
Prerequisite: T-PHY 118

*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.
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

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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:


SUGGESTED REFERENCES:


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:

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"


SUGGESTED REFERENCES:

Fletcher and Douglas. Total Environmental Control.
Simonds and Grimaldi. Safety Management.
Gilmore. Accident Prevention and Loss Control.
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:

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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:


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.

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. Organizational Types (Give Examples)
XI. Functions within the Organization

SUGGESTED TEXT:

SUGGESTED REFERENCES:


**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.

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MAJOR DIVISIONS:

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:


OR


SUGGESTED REFERENCES:


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

MAJOR DIVISIONS:

I. The Sentence
II. The Paragraph
III. The Business Letter
IV. The Whole Composition

SUGGESTED TEXTS:


SUGGESTED REFERENCES:


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:

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:


SUGGESTED REFERENCES:


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

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.

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:


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.


POSSIBLE FILMS:


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.
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.

MAJOR DIVISIONS:

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:


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

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:


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

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:


SUGGESTED REFERENCES:


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:

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:


SUGGESTED REFERENCES:

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


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:

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:


SUGGESTED REFERENCES:


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.

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:


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:

MAJOR DIVISIONS:

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

MAJOR DIVISIONS:

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:


SUGGESTED REFERENCES:

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.

MAJOR DIVISIONS:

I. Introduction

II. Basics in Statistics

III. Fishery Statistics

SUGGESTED REFERENCES:


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.

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:


SUGGESTED REFERENCES:


- #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


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


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.


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:

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:


Morgan. Human Factors in Equipment Design.

SUGGESTED REFERENCES:

Chapanis. Research Techniques in Human Engineering.

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


(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:

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

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.

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:


SUGGESTED REFERENCES:

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

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.

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:


SUGGESTED REFERENCES:


TI SC 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:

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<th>I. Sampling Considerations</th>
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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:


SUGGESTED REFERENCES:

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

Air Sampling Instruments. ACGIH.
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

MAJOR DIVISIONS:

I. Basis of Management
II. Planning
III. Organization
IV. Staffing
V. Direction
VI. Control

SUGGESTED TEXT:


SUGGESTED REFERENCES:


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:

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:


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

PREREQUISITE: None.

MAJOR DIVISIONS:

I. Principles, Techniques, Work Measurement

II. Eye Motions and Allied Topics

III. Applications Engineering

IV. Organization and Management

SUGGESTED TEXTS:


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

SUGGESTED REFERENCES:


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.

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:


SUGGESTED REFERENCES:


PREREQUISITE:

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:


SUGGESTED REFERENCES:

Sound, Noise and Vibration Control. Yerges.

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.

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:


SUGGESTED REFERENCES:


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.

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:


ALTERNATE TEXTS:


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

SUGGESTED REFERENCES:


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 outlining specifications.

PREREQUISITE: None

<table>
<thead>
<tr>
<th>Class Hours</th>
<th>Lab Hours</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>0</td>
<td>2</td>
</tr>
</tbody>
</table>

MAJOR DIVISIONS:

I. Elements of Contracts

II. Contract Documents

III. Design and Specification Notes

IV. Codes

V. General Code Study

VI. Miscellaneous Equipment

SUGGESTED TEXTS:


SUGGESTED REFERENCE:

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

PREREQUISITE: T-MAT 110

MAJOR DIVISIONS:

I. Introduction to Bookkeeping and Accounting

II. Accounting Cycle

III. Notes, Prepayments and Accruals

IV. Receivables, Inventory and Fixed Assets

SUGGESTED TEXTS:


SUGGESTED REFERENCES:


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

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:


OR


OR


SUGGESTED REFERENCE:

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

MAJOR DIVISIONS:

I. Nature and Role of Finance in our Economy

II. Review

III. Meeting the Demand for Funds

IV. Financing the Consumer

SUGGESTED TEXTS:


SUGGESTED REFERENCES:


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

<table>
<thead>
<tr>
<th>Class Hours</th>
<th>Lab Hours</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>2</td>
<td>5</td>
</tr>
</tbody>
</table>

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:


SUGGESTED REFERENCES:


SUGGESTED LABORATORY MANUALS:


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

<table>
<thead>
<tr>
<th>Class Hours</th>
<th>Lab Hours</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>0</td>
<td>3</td>
</tr>
</tbody>
</table>

MAJOR DIVISIONS:
I. The Study of Psychology
II. Relations with Other People
III. Personal Problems
IV. Group Dynamics

SUGGESTED TEXTS:

SUGGESTED REFERENCES:
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.

MAJOR DIVISIONS:

<table>
<thead>
<tr>
<th>Class Hours</th>
<th>Lab. Hours</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>0</td>
<td>3</td>
</tr>
</tbody>
</table>
T-POL 201

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

PREREQUISITE: None.

MAJOR DIVISIONS:

<table>
<thead>
<tr>
<th>Class Hours</th>
<th>Lab Hours</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>0</td>
<td>3</td>
</tr>
</tbody>
</table>
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.

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:


SUGGESTED REFERENCES:


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.

<table>
<thead>
<tr>
<th>Class Hours</th>
<th>Lab Hours</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>0</td>
<td>3</td>
</tr>
</tbody>
</table>
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.

<table>
<thead>
<tr>
<th>Major Divisions:</th>
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<tbody>
<tr>
<td>Class Hours: 3</td>
</tr>
<tr>
<td>Lab Hours: 2</td>
</tr>
<tr>
<td>Credit Hours: 4</td>
</tr>
</tbody>
</table>

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71 77
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

<table>
<thead>
<tr>
<th>Laboratory</th>
<th>Authorized Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Biology-General (No. 22)</td>
<td>$38,420.00</td>
</tr>
<tr>
<td>2. Chemistry-General (No. 28)</td>
<td>$26,800.00</td>
</tr>
<tr>
<td>3. Physics-Vocational (No. 141)</td>
<td>$13,629.00</td>
</tr>
<tr>
<td>4. Occupational Safety and Health (No. 200)</td>
<td>$23,813.00</td>
</tr>
</tbody>
</table>
### OCCUPATIONAL SAFETY AND HEALTH EQUIPMENT LIST (NO. 200)

15 Students

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

74
<table>
<thead>
<tr>
<th>Item</th>
<th>Quantity</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>22</td>
<td>1</td>
<td>Binocular Microscope</td>
</tr>
<tr>
<td>23</td>
<td>1</td>
<td>Carrying case</td>
</tr>
<tr>
<td>24</td>
<td>1</td>
<td>Sound Level Meter</td>
</tr>
<tr>
<td>25</td>
<td>1</td>
<td>Sound level meter w/octave band analyzer and import capacity</td>
</tr>
<tr>
<td>26</td>
<td>1</td>
<td>Calibrator</td>
</tr>
<tr>
<td>27</td>
<td>1</td>
<td>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.</td>
</tr>
<tr>
<td>28</td>
<td>1</td>
<td>Audiometric, Booth, with Seat and with Silent Ventilation System</td>
</tr>
<tr>
<td>29</td>
<td>1</td>
<td>Audiometer</td>
</tr>
<tr>
<td>30</td>
<td>1</td>
<td>Mass Respirable Dust Sampler</td>
</tr>
<tr>
<td>31</td>
<td>1</td>
<td>Microwave Detector</td>
</tr>
<tr>
<td>32</td>
<td>1</td>
<td>Electrobalance for Travimetric Determinations</td>
</tr>
<tr>
<td>33</td>
<td>1</td>
<td>Dessicator Cabinet for Electrobalance</td>
</tr>
<tr>
<td>34</td>
<td>1</td>
<td>High Volume Air Sampler</td>
</tr>
<tr>
<td>35</td>
<td>1</td>
<td>Gas Chromatograph &amp; Appropriate Detectors for OSHA Charcoal Absorption Method of Vapor Sampling</td>
</tr>
<tr>
<td>36</td>
<td>10 boxes</td>
<td>Smoke Tubes and Bulbs</td>
</tr>
<tr>
<td>37</td>
<td>50</td>
<td>Field Monitors (3 piece)</td>
</tr>
<tr>
<td>38</td>
<td>1 box</td>
<td>Filters, 5 micron</td>
</tr>
<tr>
<td>Item</td>
<td>Quantity</td>
<td>Description</td>
</tr>
<tr>
<td>------</td>
<td>----------</td>
<td>----------------------------------------------------------</td>
</tr>
<tr>
<td>39</td>
<td>1 box</td>
<td>Back up pads</td>
</tr>
<tr>
<td>40</td>
<td>6</td>
<td>Clamps for field monitors</td>
</tr>
<tr>
<td>41</td>
<td>1</td>
<td>Tape measure, 12 ft.</td>
</tr>
<tr>
<td>42</td>
<td>1</td>
<td>Masking Tape</td>
</tr>
<tr>
<td>43</td>
<td>1</td>
<td>Extension Cord</td>
</tr>
<tr>
<td>44</td>
<td>10 boxes</td>
<td>Organic Vapor Absorption Tubes for Gas Chromatograph</td>
</tr>
</tbody>
</table>

Total Cost: $23,813.00
BIBLIOGRAPHY

OCCUPATIONAL SAFETY


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


**OCCUPATIONAL HEALTH**


American Conference of Governmental Industrial Hygienists, *Threshold Limit Values*, Cincinnati: American Conference of Governmental Industrial Hygienists.


INDUSTRIAL FIRE PROTECTION


**MOTOR FLEET SAFETY**

___, *Motor Fleet Safety Supervisor*, University Park, Pa.: Institute of Public Safety, Penn. State University.


SOURCES FOR ADDITIONAL REFERENCES


SOURCES OF INFORMATION

OCCUPATIONAL SAFETY
AND HEALTH

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