

principles of biological origin and a discussion of plant growth substances.  
Prerequisite: Pharmacognosy 471. (3+3)

**Pharmacognosy 473. PHARMACOGNOSY 3.** Four quarter hours.

A continuation of Pharmacognosy 472 with special emphasis on those drugs obtained from animals and microorganisms, but also including a discussion of toxic plants and animals, allergenic plants and substances and an introduction to herbicides, insecticides, rodenticides, and other pesticides.  
Prerequisite: Pharmacognosy 472. (3+3)

## PHARMACOLOGY

**Pharmacology 571. PHARMACOLOGY 1.** Four quarter hours.

A study of the action, mechanism of action, absorption, fate, excretion, toxicity and therapeutic uses of official and selected non-official drugs grouped according to their effect on physiological systems. The laboratory experiments are designed to show drug activity on excised organs and intact animals. Prerequisites: Pharmacy 463, Pharmacognosy 473, Pharmaceutical Chemistry 483. (3+3)

**Pharmacology 572. PHARMACOLOGY 2.** Four quarter hours.

A continuation of Pharmacology 571. Prerequisite: Pharmacology 571. (3+3)

**Pharmacology 573. PHARMACOLOGY 3.** Four quarter hours.

A continuation of Pharmacology 572. Prerequisite: Pharmacology 572. (3+3)

## PHYSICAL EDUCATION

**Physical Education 121C.** One-half quarter hour.

A coeducational class in physical education. Dancing, team and individual sports and games appropriate for coeducational groups. This offering may be substituted for physical education 121 M or W.

**Physical Education 122C.** One-half quarter hour.

A continuation of P.E. 121C. This offering may be substituted for P.E. 122M or W.

**Physical Education 123C.** One-half quarter hour.

A continuation of P.E. 122C. This offering may be substituted for P.E. 123M or W.

**Physical Education 121M or 121W.** One-half quarter hour.

This course is required of all first year students not excused under the regulations described in the sections of the catalog covering student activities and general information. This course covers fundamentals, rules and actual participation in organized team and individual in-season sports with emphasis on carry-over values. Fall quarter. (0+2)

**Physical Education 122M or 122W.** One-half quarter hour.

Continuation of 121M or W. Winter quarter. (0+2)

**Physical Education 123M or 123W.** One-half quarter hour.

Continuation of 122M or W. Spring quarter. (0+2)

**Physical Education 121V.** One-half quarter hour.

Participation in varsity football during the fall quarter; concentrated learning of fundamentals of the game, rules, and basic plays; emphasis on skills and attitudes helpful to a satisfying life after college. This offering may be substituted for Physical Education 121M during the fall quarter.

**Physical Education 122V.** One-half quarter hour.

Participation in varsity basketball during the winter quarter; concentrated learning of fundamentals of the game, rules, and basic plays; emphasis on skills and attitudes helpful to a satisfying life after college. This offering may be substituted for Physical Education 122M.

**Physical Education 123V.** One-half quarter hour.

Participation in varsity baseball, track, golf, or tennis during the spring quarter; concentrated learning of fundamentals of the game, rules, and basic plays; emphasis on skills and attitudes helpful to a satisfying life after college. This offering may be substituted for Physical Education 123M during the spring quarter.

## PHYSICAL SCIENCE

**Physical Science 101. THE PHYSICAL WORLD 1.** Four quarter hours.

The course introduces the student to an integrated study of the physical world. It gives the student an understanding of the scientific method and the role the method has played in the intellectual history of mankind. It includes practical, everyday applications of physical science principles. Basic principles of physics and chemistry are considered. (3+2)

**Physical Science 102. THE PHYSICAL WORLD 2.** Four quarter hours.

A continuation of Physical Science 101. Basic principles of astronomy, meteorology and geology are considered. (3+2)

## PHYSICIAN'S OFFICE ASSISTANT

**Physician's Office Assistant 120. ORIENTATION TO PHYSICIAN'S OFFICE WORK.** Two quarter hours.

This course is designed to introduce to the student the study of physicians' office assisting as a career field. Study of office routine. Visits to physicians' offices, local hospital, health service and local health department. Lectures by visiting doctors and public health officials. (2+0)

**Physician's Office Assistant 121. NURSE AIDE TECHNIQUES 1.** Three quarter hours.

A further study of the field of physicians' office assisting. An overview of the history of medical practice and the consideration of medical ethical foundations of conduct and their application to the physicians' office assistant. Beginning study and practice of routine office duties, including housekeeping, care and use of equipment, supply inventory. Introduction to instruments, including names, use, care, and identification. Emphasis is placed on medical terminology, general cleanliness, personal hygiene, and protection against infection in the physicians' office. (2+3)

**Physician's Office Assistant 122. NURSE AIDE TECHNIQUES 2.** Two quarter hours.

An introductory laboratory and practical experience course. Study of diseases, their etiology, symptoms, and treatment; normal nutrition and presentation of modifications of normal nutrition; elementary first aid; and reasons for and techniques of bandaging. Standardization of dressings and making swabs, dressings and cotton balls. (1+3)

**Physician's Office Assistant 223. NURSE AIDE TECHNIQUES 3.** Four quarter hours.

Continuation of Physician's Office Assistant 122. Study of bacteriology and sterilization: principles and methods of sterilizations; preparation of sterile supplies; medical and surgical asepsis. Demonstration and practice in assisting the physician with examinations; methods of examinations; set-up for examination; preparation and draping of patient for various types of examinations; collection, care and handling of specimens. Demonstration and practice in techniques of taking blood pressure, temperature, pulse and respiration; different methods of taking temperature and points to be observed in taking pulse and respiration. Review of fundamentals of systems of measures. Prerequisite: Biology 131. (2+6)

**Physician's Office Assistant 224. NURSE AIDE TECHNIQUES 4.** Four quarter hours.

Continuation of Physician's Office Assistant 223. Demonstration and practice in setting up for medical office procedures and assisting the physician, and special set-ups for assisting the specialist. Computation and preparation of solutions and dosages with practical applications to medical office situations. Orientation to and demonstration of preparations for injections; patch tests; reasons for injections; preparation for and assisting doctor with injections and withdrawing of blood. (2+6)

**Physician's Office Assistant 225. COOPERATIVE WORK EXPERIENCE.** Four quarter hours.

Observation and practical work experience in a selected physician's office. One hour seminar each week for discussion of work experience. (1+8)

**Physician's Office Assistant 226. MEDICAL LABORATORY ORIENTATION.** Three quarter hours.

An introduction to the medical laboratory, with emphasis upon the use

and care of specialized apparatus, the techniques of weighing and filtering; mixing and standardizing of common solutions and reagents; the terminology employed in reporting laboratory findings. (2+3)

**Physician's Office Assistant 227. MEDICAL LABORATORY TECHNIQUES.** Four quarter hours.

Lectures, demonstrations, and laboratory experience to familiarize the student with the routine laboratory procedures commonly used in clinics and in the physicians' office. Qualitative urinalysis, hematology, the microscopical examination of smears and sediments. Demonstration of the techniques used in BMR and EKG determinations. Laboratory experience for students enrolled in Physician's Office Assistant 225. (2+6)

## PHYSICS

**Physics 221. GENERAL PHYSICS 1.** Four quarter hours.

Weights and measures. Machines. Pressure. Forces. Properties of matter. Motion. Energy. Prerequisite: Mathematics 122. (3+3)

**Physics 222. GENERAL PHYSICS 2.** Four quarter hours.

Temperature. Heat. Physics of the atmosphere. Sound. Light. Optical instruments. Color. Polarized light. Prerequisite: Physics 221. (3+3)

**Physics 223. GENERAL PHYSICS 3.** Four quarter hours.

Magnetism. Electric currents and circuits. Magnetic and chemical effects of electrical currents. Generators and motors. Radio and electronics. X-ray and radio activity. Prerequisite: Physics 222. (3+3)

**Physics 450. THEORY OF PHOTOGRAPHY.** One quarter hour.

Films. Cameras. Lenses. Shutters. Exposure time. Developing. Enlarging. Composition. Filters. Color photography. Laboratory restricted to those enrolled in this course. Prerequisite: Physics 222. Student supplies own equipment and supplies. (1+3)

## POLITICAL SCIENCE

**Political Science 121. PRINCIPLES OF AMERICAN GOVERNMENT 1.**  
Three quarter hours.

The first term of a two-term sequence.

A two-term sequence covering the same materials traditionally included in a course in American National Government and a course in American State Government. It differs from the traditional courses in that the study of national, state and local government is integrated in a functional study of government.

Since the course begins with a study of the broader aspects of the American federal state and the more universal functions of government and proceeds to the more specialized and more localized functions, the role of the national government receives more attention in Political Science 121,

while the role of the states and local units receive more attention in Political Science 122. (3+0)

**Political Science 122. PRINCIPLES OF AMERICAN GOVERNMENT 2.** Three quarter hours.

A continuation of Political Science 121. (3+0)

**Political Science 223. INTERNATIONAL ORGANIZATIONS.** (Formerly Political Science 123.) Four quarter hours.

A survey of the major problems arising in the field of international relations and the agencies, instruments, and organizations devised for their solution, with special reference to the problems related to the maintenance of peace. Prerequisite: Political Science 121. (4+0)

## **PSYCHOLOGY**

**Psychology 221. INTRODUCTORY GENERAL PSYCHOLOGY.** Three quarter hours.

An introductory course serving as a scientific basis for work in education as well as an introduction to the field of psychology itself. Lectures are supplemented by notes, study of textbooks, reports on outside readings, and class discussion. Open to Freshmen. (3+0)

**Psychology 222. ADVANCED GENERAL PSYCHOLOGY.** Three quarter hours.

This is the second course in general psychology. The basic structural and functional principles of adult normal behavior are emphasized. Among the topics considered are intelligent behavior, attending, thinking, motivation, emotion, habit and personality formation and their application in various fields of activity. Prerequisite: Psychology 221. (3+0)

**Psychology 223. EDUCATIONAL PSYCHOLOGY.** Three quarter hours.

An application of the principles of psychology to the practical work of the teacher. Outside readings, written exercises, and notebook required. Prerequisite: Psychology 221. (3+0)

**Psychology 251. PERSONALITY IMPROVEMENT.** Four quarter hours.

The purpose of this course is to help the student to increase his personal and professional efficiency through the improvement of his personality. Many tests are given, such as intelligence tests, tests of minimum essentials in achievement, personality surveys, vocational aptitude tests, vocabulary and speech tests, tests indicating objectionable personal qualities, etc. Lectures and individual conferences. (4+0)

**Psychology 252. PSYCHOLOGY OF BUSINESS.** Four quarter hours.

The purpose of this course is to apply the principles of present day psychology to business to enable the executive to improve his leadership qualifications and to secure better employee relations, to increase the worker's efficiency, and to improve relations with customers and the public. (4+0)

**Psychology 253. SUPERVISORY TRAINING.** Three quarter hours.

Designed to acquaint the student with the duties and responsibilities of the supervisor. An introduction to supervision techniques. The supervisor's relationship to the employee and the employer. Instruction and practice in conference-leading techniques.

This course is designed for students in the specialized programs of the Collegiate Technical Terminal Division. (3+0)

**Psychology 321. PHYSIOLOGICAL PSYCHOLOGY.** Four quarter hours.

A course which stresses the relationships between pharmaceutical and psychological knowledge. It includes a review of the physiological mechanisms of the body and a study of psychological manifestations of various personality patterns and emotional states. Also included are the effects which drugs have on human behavior under varying conditions of the body and mind. (4+0)

**Psychology 325. SOCIAL PSYCHOLOGY.** Three quarter hours.

A course dealing with the dynamics of social behavior as applied to individuals, groups, and institutions: the individual's behavior as it is influenced by cultural forces; the psychology of folkways, mores, taboos and other cultural values; the foundations of personality and the socialization of the individual. Prerequisite: Psychology 221. (3+0)

**Psychology 421. PSYCHOLOGY OF ADOLESCENCE.** Four quarter hours.

Comprehensive study of the problems which affect and beset young people in the year of transition from childhood to adulthood: Physiological changes: emotional, mental, and social development and adjustment; juvenile delinquency; educational and vocational guidance. Lectures largely supplemented by reports, outside reading, and class discussions. Prerequisite: Psychology 221. (4+0)

**Psychology 422. ABNORMAL PSYCHOLOGY.** Four quarter hours.

A course dealing with the abnormalities of certain types of personalities, their origin, symptoms, developments, and treatment, short of psychiatric competence. Main topics simple maladjustment; disturbances of emotional nature, of perception, attention, memory, judgment, of thought; disorders of motility, of speech, etc.; early symptoms of schizophrenia and description of its four stages of development. Special attention will be given to mental hygiene. For prospective teachers and students with special interest in psychology. Prerequisite: Psychology 221. (4+0)

## **PUBLIC HEALTH**

**Public Health Practices 100. ORIENTATION TO ENVIRONMENTAL HEALTH.** Two quarter hours.

Lectures, field trips, and discussions designed to acquaint the student with the major areas of public health vocations and the several areas of the environment which come under the influence of the Sanitarian Assistant.

Students are made aware of the opportunities available to the graduate. Students are introduced to the basic public health literature in general use. A general knowledge of the origin and progress of the Sanitary Science field is included, with emphasis on the role of the technician. (2+0)

**Public Health Practices 101. PUBLIC HEALTH PRACTICES 1.** Three quarter hours.

An introduction to the Public Health Field. The philosophy, history and development of the Public Health Profession is discussed. Government in general and public health in particular are studied from the federal, state and municipal levels. The application, interpretation and enforcement of various public health laws as they relate to sanitation, production and distribution of foods, drugs, and devices are included. (3+0)

**Public Health Practices 102. PUBLIC HEALTH PRACTICES 2.** Three quarter hours.

A continuation of P.H.P. 101 and includes a thorough evaluation and study of ethics applicable to the Public Health Officer. Medical terminology in general and public health terminology in particular are introduced to the student. A study is made of the practical application to public health education methods. Included in the course is a limited project in community organization to solve specific health problems, use of various visual aids, and preparation of public health education materials. Field orientation is part of this course and is designed to familiarize the student with actual working conditions in the field and with the typical lay-outs and equipment encountered by public health sanitarians. (3+0)

**Public Health Practices 103. RESTAURANT AND MILK SANITATION.** Three quarter hours.

A basic course in environmental sanitation relating particularly to the control of restaurants, cafes, public eating and drinking establishments. This course also includes instruction with field observation of dairy farm milk production methods, pasteurization and milk plant operation, equipment used, inspection techniques and controls, and quality control of the product. The various laws and codes administered through lecture and discussion methods and field trips, supplemented when needed with laboratory work. (2+3)

**Public Health Practices 104. FOOD PRESERVATION AND MEAT TECHNOLOGY.** Three quarter hours.

A study of the basic principles of food preservation with particular emphasis on quick-freezing, canning and dehydration, fermentation, pickling, smoking, and an understanding of commercial cutting of meat. Field trips and specialized laboratory work supplement the lectures. (2+3)

**Public Health Practices 105. ENVIRONMENTAL SANITATION.** Three quarter hours.

A general course designed to supplement and extend the more specialized work of the other courses in the program. Emphasis is on the consideration of public nuisances, and hygiene of housing including plumbing and rodent

control. Private home and public institution aspects of water and sewage disposal with special emphasis on problems which confront an environmental sanitarian will be presented. Resort sanitation is analyzed, and the student is advised of building codes and laws applicable to both rural and urban areas. This course includes laboratory analysis of water, sewage, and industrial wastes. Laboratory periods correlate some of the lecture material. (2+3)

**Public Health Practices 106. WATER AND SEWAGE.** Three quarter hours.

This course covers private and public sewage and water systems. Emphasis is placed on the construction of private water and sewage systems and why they are so constructed—from a public health viewpoint. Various types of public water and sewage systems are discussed with emphasis on their good and bad features. State codes are studied and analyzed during the term. Correlated laboratory and field trips stress the practical application of class room lectures. (2+3)

**Public Health Practices 107. PUBLIC HEALTH SEMINAR.** Three quarter hours.

During the final quarter each student in the Environmental Sanitarian Assistant program meets with the faculty member to discuss problems which he has met in his training and problems which he will probably face in his cooperative work experience. In the seminar special emphasis is placed on Public Health terminology and the study of reports and special articles dealing with Public Health problems. (3+0)

**Public Health Practices 108. COOPERATIVE WORK EXPERIENCE.** Eight quarter hours.

Students spend six weeks in on-the-job training at one of the county public health departments designated as training stations by the Michigan Department of Health. Students receive training in the special areas of general food inspection, milk and dairy products inspection, restaurant inspection, and environmental sanitation.

**Public Health Practices 110. PUBLIC HEALTH MATERIALS.** Two quarter hours.

Emphasis is given to descriptive data from the public health field. This data includes the rates and ratios used to evaluate mortality and morbidity. Attention is given to the statistical study of bacteriological laboratory data as related to the sanitary science field, which is accomplished through tabular and graphical presentation of the reliability and the interpretation of the significant differences in such data. (2+0)

## **SECRETARIAL TRAINING**

**Secretarial Training 101. SECRETARIAL ORIENTATION.** One quarter hour.

A series of lectures, demonstrations and selected films dealing with personal grooming, personality development, office etiquette and job adjust-

ments; office organization and management; the purpose, institutions, and fundamental decisions of our economic system, capital goods and standards of living, the price system; labor organization, purposes, policies, and practices; government and business; money, banking, and credit; insurance and social security. Prerequisite: Matriculation in one of the secretarial, or commercial teacher education curricula. Enrollment limited to women students. (1+0)

**Secretarial Training 121. ELEMENTARY TYPEWRITING.** Three quarter hours.

Position at the machine, most used machine parts, stroking techniques, speed-building techniques, development of accuracy, introduction to block form personal letters and short business letters, elementary forms of tabulation and centering drills. (5+0)

**Secretarial Training 122. INTERMEDIATE TYPEWRITING.** Three quarter hours.

Review of techniques of elementary typewriting; continuation of speed-building; introduction of modified block letter, punctuation at the typewriter; forms, erasing techniques, envelopes, carbons, tabulation, rules for use of numbers, literary titles; use of the apostrophe; hyphenation; procedures for cleaning the typewriter. Prerequisite: Secretarial Training 121 or equivalent. (5+0)

**Secretarial Training 123. ADVANCED TYPEWRITING.** Three quarter hours.

Continued speed-building techniques, completion of all forms of letters, complex tabulation, rough draft, manuscript writing, legal documents, business forms, application letters and data sheets, production techniques, problem typewriting. Prerequisite: Secretarial Training 122 or equivalent. (5+0)

**Secretarial Training 124. APPLIED TYPEWRITING.** Two quarter hours.

Complex tabulation problems, rough draft, letter corrections, use of the mimeograph and liquid process duplicators. Laboratory work requiring practice on matter for actual office use. Prerequisite: Secretarial Training 121, or equivalent, and permission of instructor. (2+1)

**Secretarial Training 131. ELEMENTARY SHORTHAND.** Four quarter hours.

Principles of Gregg Shorthand Simplified, including mastery of brief forms; development of skill in reading and fluency in writing shorthand; simple new-matter dictation; development of the ability to write familiar material at a minimum rate of 70 words per minute and new material at a minimum rate of 50 words per minute for three minutes. (5+0)

**Secretarial Training 132. INTERMEDIATE SHORTHAND.** Four quarter hours.

Increasing emphasis upon skill in reading and writing Gregg shorthand; development of skill in formulating new outlines in accordance with the basic principles of writing Gregg shorthand; introduction to transcription

techniques, a minimum dictation skill of 80 words per minute on familiar material and 60 words per minute on new material for five minutes is required. Prerequisite: Secretarial Training 131 or equivalent. (4+0)

**Secretarial Training 133. ADVANCED SHORTHAND AND TRANSCRIPTION.** Four quarter hours.

Development of ability to write new-matter dictation; improvement of transcription techniques; increasing emphasis on the development of speed and accuracy in transcription on the typewriter of new-matter dictation. A minimum dictation rate of 100 words per minute on familiar material and 70 words per minute on new material for five minutes with a minimum transcription rate of 20 words per minute is required. Prerequisites: Secretarial Training 122 and 132 or equivalent. Twenty hours of cooperative office training in the offices at Ferris is required. (4+0)

**Secretarial Training 221. BUSINESS WRITING.** Four quarter hours.

Practical application of English skills to the need of business. Brief review of essentials of grammar and punctuation. Types of Business Correspondence assigned as written exercises. Extensive study of original letters that have been successfully used in business. Prerequisites: Communication Skills 101 and Secretarial Training 121, or equivalent. (4+0)

**Secretarial Training 231. DICTATION AND TRANSCRIPTION.** Four quarter hours.

Development of the ability to take dictation at a minimum rate of 100 words per minute on new-matter dictation and to transcribe at a minimum rate of 25 words per minute. Considerable attention given to transcription with emphasis directed toward development of the typewriting, shorthand, and technical English skills necessary for efficient transcription. Twenty hours of cooperative office training in the office at Ferris is required. Prerequisites: Secretarial Training 123 and 133 or equivalents. (4+0)

**Secretarial Training 232. ADVANCED DICTATION AND TRANSCRIPTION.** Four quarter hours.

Continued emphasis on increasing ability to take new-matter dictation. Appropriate time devoted to building a high degree of skill in transcribing letters of all lengths, memoranda, articles, and reports. Development of typewriting, shorthand and technical English skills to high degree. Production stressed. Students expected to have commercially usable dictation and transcription skill upon the completion of the course. 20 hours of cooperative office training in the office at Ferris is required. Prerequisite: Secretarial Training 231. (4+0)

**Secretarial Training 233. SPECIALIZED DICTATION AND OFFICE PROBLEMS.** Three quarter hours.

A course designed to provide exceptional students an opportunity to develop high speed in taking and transcribing dictation; legal and technical dictation; conference and court reporting; specialized recording and filing. Prerequisites: Secretarial Training 232 and 124. (3+0)

**Secretarial Training 241. SECRETARIAL OFFICE PRACTICE.** Four quarter hours.

A course primarily vocational in character and covering the following major areas: the elements of a successful business personality; the secretary's responsibility for public relations including functional use of written and oral business communications and the duties of a receptionist; practice in the location of information for both usual and unusual secretarial duties; the techniques of handling mail and modern business forms. Prerequisites: Secretarial Training 123 and 133. (4+0)

**Secretarial Training 242. OFFICE MANAGEMENT.** Four quarter hours.

Organization of the office, managerial considerations, office furniture and equipment, office machines, working conditions, office layout, records and reports, personnel and training, office manuals, budgets and costs, vocational information, and automated data processing and its implications. Also listed as Commerce 241—Office Management. (4+0)

**Secretarial Training 245. BUSINESS FILING.** Two quarter hours.

A course in filing specifically designed for beginning office workers who need a knowledge of the various filing procedures commonly used in business and industry. Indexing and filing rules will be stressed for the alphabetic, subject, numeric, Kardex, and geographic systems. (2+0)

**Secretarial Training 251. VOICE TRANSCRIPTION.** Two quarter hours.

Development of commercially usable voice-transcription skill. Operation of belt- and cylinder-type Dictaphones and the disc- and cylinder-type Ediphones. Attention of the students directed toward the development of the typewriting and technical English skills necessary for efficient transcription. Prerequisite: Secretarial Training 122. (2+1)

**Secretarial Training 252. OFFICE MACHINES.** Two quarter hours.

Training in fundamental arithmetic processes on rotary calculators, key-driven calculators, adding-listing machines, listing calculators, and posting machines. Prerequisite: Commerce 121, or equivalent. (2+1)

**Secretarial Training 261. COOPERATIVE OFFICE TRAINING.** Four to eight quarter hours.

A work experience program in school or in business offices. Credit may be granted for work experience under the following conditions: (1) Approval of the work situation by the appropriate school authority, (2) completion of a variety of office tasks, (3) development of production skills on assigned tasks, (4) satisfactory work reports of the employer and college supervisor. A minimum of 144 clock hours of work must be completed for each four quarter hours of credit granted. Prerequisite: Secretarial Training 124, 231, and 241.

**Secretarial Training 271. MEDICAL SHORTHAND AND TRANSCRIPTION.** Four quarter hours.

Theory of medical terminology, outlines of medical terms, dictation of

case histories, medical abstracts, scientific articles. Prerequisite: Secretarial Training 133. (4+0)

**Secretarial Training 272. MEDICAL OFFICE PRACTICE.** Four quarter hours.

Telephone courtesy, appointments, discussion of fees, billing, collecting procedures; health insurance and workmen's compensation forms; mailing activities; filing. (4+0)

**Secretarial Training 273. MEDICAL VOICE TRANSCRIPTION.** Two quarter hours.

Transcribing of business and medical dictation records. (Elective) Prerequisite: Secretarial Training 123. (2+1)

**Secretarial Training 274. MEDICAL OFFICE RECORD KEEPING.** Three quarter hours.

Introduction to the principles of accounting, medical record keeping, practice set; office maintenance. (3+0)

**Secretarial Training 275. DENTAL OFFICE RECORD KEEPING.** Three quarter hours.

Introduction to the principles of accounting, dental office record keeping, practice set; office maintenance. (3+0)

**Penmanship. NO CREDIT.**

A non-credit course designed for the purpose of improving the general quality of the student's handwriting, and emphasizing methods of developing ease and rapidity in writing. Students are assigned to the class upon demonstration of need.

**Spelling. NO CREDIT.**

A non-credit course for the purpose of improving spelling ability. Words selected from business vocabulary studies. Students are assigned to the spelling class upon demonstration of need.

## **SOCIAL SCIENCE**

**Social Science 101. MAN AND SOCIETY 1.** Three quarter hours.

An analytical study of selected problems of man in his social surroundings, drawing from all of the social science fields and designed to give the student the background necessary for understanding and interpreting the major aspects of his social and cultural environment. Emphasis is placed on the inter-relations which exist between all aspects of man's culture and social institutions. (3+0)

**Social Science 102. MAN AND SOCIETY 2.** Three quarter hours.

This course is a continuation of Social Science 101. These courses will serve either as foundation courses for further study in the social sciences or as a general survey of the social sciences for the student majoring in other fields of study. (3+0)

## **SOCIOLOGY**

### **Sociology 115. PLANNING FOR MARRIAGE.** Two quarter hours.

A study of cultural patterns in dating, courtship, and engagement. Special emphasis is placed on factors involved in mate selection such as personality, family backgrounds, and socio-economic influences. The subject of marriage and the family is considered, but major emphasis is placed on preparation for marriage. (2+0)

### **Sociology 221. INTRODUCTORY SOCIOLOGY.** Four quarter hours.

An introductory course in the study of man's behavior as it is affected by group situations and relationships. Included is a brief study of the scientific method, and examination of culture, an investigation into the nature of social groups and societal structures, and an introduction into the functioning of some social institutions. Throughout the course, principles which are basic for the understanding of society are stressed. Open to freshmen. (4+0)

### **Sociology 225. MARRIAGE AND THE FAMILY.** Three quarter hours.

Adjustment in marriage; interpersonal relationships in family living; husband and wife roles in marriage; father and mother roles in family life. Consideration is given to the sociology of the family, and the place of the family in American culture. (3+0)

### **Sociology 231. GENERAL ANTHROPOLOGY.** Four quarter hours.

An introductory course which considers the beginnings of human society; origin, nature, and diffusion of culture with application to contemporary cultures. (4+0)

## **SPEECH**

### **Speech 111. VOICE AND DICTION.** Four quarter hours.

Improving the speaking voice. Emphasis is placed upon developing clear articulation, pleasing vocal quality, adequate loudness and projection, a varied and expressive voice and correct habits of pronunciation. (4+0)

### **Speech 121. FUNDAMENTALS OF SPEAKING.** Four quarter hours.

Drill in the organization and delivery of short talks and panel discussions, emphasis being placed on the conveying of ideas orally in a clear, logical, and concise manner. This is not a course in oratory, but a practical course in effective speaking on occasions confronted frequently by citizens of a democracy. Enough work in parliamentary practice is given to enable the student to preside over and to participate in ordinary business sessions. (4+0)

### **Speech 122. DISCUSSION AND DEBATE.** Four quarter hours.

A study of principles and methods of group discussion and debate in their various forms. Practice is given in applying these principles to a consideration of questions of current interest and importance. (4+0)

**Speech 123. INTERCOLLEGIATE DEBATE.** Two quarter hours.

A laboratory course applying the principles of argumentation and debate in contest situations. The questions used for intercollegiate debate will be studied intensively. Two hours of credit may be earned each quarter, but not more than six hours of credit may be counted toward graduation. (0+4)

**Speech 221. GROUP DISCUSSION PROCEDURES.** Two quarter hours.

The cooperative nature of group speech activity is stressed. Emphasis is placed on how to lead group discussions and on how to participate in them effectively. Enough practice in business meeting procedure is given to enable the student to preside over and to participate in ordinary group meetings. The principles and methods of group discussion are applied to problems of current interest and importance. (2+0)

**Speech 222. ACTING.** Four quarter hours.

Interpretation of roles through voice, gestures, and bodily action blended into characterization; special problems of the actor; study of various types of drama and their differing demands in characterization; laboratory instruction in these areas in connection with college dramatic production planned and conducted under the supervision of the instructor at least four hours per week. (2+4)

**Speech 223. PLAY PRODUCTION AND DIRECTION.** Four quarter hours.

Various units of play production—play selection, casting, direction, stage design, scenery construction, make-up, costuming, business management, advertising; production of plays in high schools and community theatres; laboratory instruction in these areas in connection with college dramatic productions planned and conducted under the supervision of the instructor at least four hours per week. (2+4)

**Speech 224. APPLIED DRAMATICS.** Two quarter hours.

A laboratory course in the production of plays. Students enrolling in this course will receive training in stagecraft, acting, and directing. Two hours of credit may be earned each quarter, but not more than six hours of credit may be counted toward graduation. (0+4)

**Speech 231. INTERPRETATIVE READING.** Four quarter hours.

Consideration of the fundamental principles of effective oral reading. Attention is given to the reading of both prose and poetry. Practice is provided in both individual and group reading. (4+0)

**Speech 232. PERSUASIVE SPEAKING.** Four quarter hours.

This course provides consideration of the use of speech for the purpose of persuading others. Psychological principles of persuasion are considered, with practical applications through preparation and delivery of original speeches. Prerequisite: Speech 121 or its equivalent. (4+0)

**Speech 233. PUBLIC SPEAKING.** Two quarter hours.

An advanced speech course. Addresses for different occasions are con-

sidered; emphasis is placed on adjusting the approach to the specific audience. Careful attention is given to effective organization and delivery. Prerequisite: Speech 121 or its equivalent. (2+0)

## **SURVEYING AND TOPOGRAPHICAL DRAFTING**

**Surveying and Topographical Drafting 101. ORIENTATION TO CONSTRUCTION METHODS AND PRACTICES.** Three quarter hours.

This course covers an introduction to the general field of construction with an emphasis on the role of the technician. Construction methods, operations, and equipment used in the light and heavy construction fields are studied. The role of the surveyor in construction operations is evaluated. The student in cooperation with his math class is taught the use of the slide rule during this quarter of orientation. (2+3)

**Surveying and Topographical Drafting 102. MATERIALS OF CONSTRUCTION.** Three quarter hours.

The major materials used in construction are introduced. Concrete, its properties and design, bituminous concrete, brick, tile, and wood are the major materials covered. An introduction to certain basic properties of steel and non-ferrous metals and plastics are also included. (2+2)

**Surveying and Topographical Drafting 103. THEORY OF LAND SURVEYING 1.** Three quarter hours.

Subdivision of public lands, Bureau of Land Management Survey. Original survey, resurvey, and subdivision survey. Methods and legal descriptions. (3+0)

**Surveying and Topographical Drafting 104. THEORY OF LAND SURVEYING 2.** Three quarter hours.

A continuation of Surveying and Topographical Drafting 103 including the preparation of a plat, survey law, and legal interpretations, and professional ethics. Prerequisite: Surveying and Topographical Drafting 103. (3+0)

**Surveying and Topographical Drafting 105. ENGINEERING GEOLOGY.** Three quarter hours.

Fundamental principles of geology, including a study of minerals and rocks. Aerial photographs, topographic and aerial geologic maps and geologic cross sections are studied in the laboratory. Extensive use of geological literature and maps. (2+3)

**Surveying and Topographical Drafting 201. SURVEYING 1.** Four quarter hours.

Proper survey procedures are introduced. Instruction is given in the principles of surveying and in the operation of surveying equipment and instruments. General surveying; measuring lines, angles and differences in elevation, methods of keeping field notes, computing areas and volumes,

and profile leveling, construction surveying, fundamentals and terminology of map making. Prerequisite: Mathematics 121. (2+8)

**Surveying and Topographical Drafting 202. SURVEYING 2.** Four quarter hours.

A continuation of Surveying 1. Introduction to the control and distribution of errors; preparation of maps, computation of the coordinates and areas of enclosed figures from data secured in the field. Introduction to principles of triangulation, land surveys, land and title description, road surveying, railroad and highway curves. Prerequisites: Surveying and Topographical Drafting 201 and Mathematics 122. (2+8)

**Surveying and Topographical Drafting 203. SURVEYING 3.** Four quarter hours.

The opportunity is provided for field projects of various kinds for the student to gain practical experience. Specialized surveying problems are used in cooperation with the advanced course, Topographical Mapping 2. The senior class works on selected problems as a group reviewing surveying techniques, and they discuss in seminar the various aspects of their two-year program as they relate to these selected problems with emphasis on integrating their skills and training into a meaningful relationship. Prerequisite: Surveying and Topographical Drafting 202. (2+8)

**Surveying and Topographical Drafting 204. SURVEYING CALCULATIONS.** Two quarter hours.

An introduction to the theory of probability, triangulation and astronomy. Computations involved in celestial observations. Prerequisite: Surveying and Topographical Drafting 201 and Mathematics 122. (2+0)

**Surveying and Topographical Drafting 205. TOPOGRAPHICAL DRAFTING AND MAPPING 1.** Three quarter hours.

An introduction to the science of topography. A basic course in topographical mapping. Integrated with the student's surveying courses, this course is designed to teach the fundamentals of topographical mapping. Prerequisites: Engineering Graphics 122 and Surveying and Topographical Drafting 105. (1+6)

**Surveying and Topographical Drafting 206. TOPOGRAPHICAL DRAFTING AND MAPPING 2.** Two quarter hours.

A continuation of Topo-Drafting 1. Emphasis is placed on increasing the student's skill in mapping physical land features and introducing controlled planimetric mapping from aerial photographs. The student is assigned practical problems in the field as part of the required work during this course. Close cooperation with the Advanced Surveying class is maintained. Prerequisite: Surveying and Topographical Drafting 205. (0+6)

**Surveying and Topographical Drafting 207. NATURE OF SOILS.** Three quarter hours.

An introductory course for the technical student in the basic physical and geological aspects of soils, soil characteristics, and classification. Lec-

tures, references, problems and field trips are included in the course requirements. Prerequisites: Surveying and Topographical Drafting 102, 105, and Mathematics 122. (2+3)

**Surveying and Topographical Drafting 208. ELEMENTS OF CONSTRUCTION.** Three quarter hours.

This course includes the fundamentals of strength of materials and a study of the aspects of such construction projects as: hydraulic structures, earth structures, bridges and industrial buildings. Prerequisite: Surveying and Topographical Drafting 207, Physics 221, or permission of the instructor. (2+3)

**Surveying and Topographical Drafting 209. INTRODUCTION TO HYDRAULICS AND HYDROLOGY.** Three quarter hours.

The course includes fundamental principles of liquid flow in pressure conduits and open channels, hydrologic cycle, run-off collection systems, and stream flow. Prerequisites: Surveying and Topographical Drafting 105 and Mathematics 121. (3+0)

**Surveying and Topographical Drafting 210. ELEMENTS OF HIGHWAY DESIGN AND FLAT SURFACE DESIGN.** Three quarter hours.

Fundamental theories and standard practices involved in highway construction as well as in concrete and bitulethic pavements are considered in this course. It includes a study of horizontal and vertical curves, super-elevation, grades, drainage systems, secondary roads, traffic control designs, through ways, and grade separations. Flat surface design, parking installations, curbing and sports facilities are also included. Prerequisite: Surveying and Topographical Drafting 202. (2+3)

**Surveying and Topographical Drafting 211. ENGINEERING DOCUMENTS.** Two quarter hours.

A study is made of the problems of estimating cost of labor, machinery, and materials for evacuation, and construction of foundations, concrete work, etc. The student is introduced to documents relating to advertisements, bid proposals, contracts, and general conditions, and technical specifications for engineering work. Prerequisite: Surveying and Topographical Drafting 208 and 210. (2+0)

# SCHOOL OF APPLIED ARTS AND SPECIALIZED EDUCATION

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## TRADE AND INDUSTRIAL DIVISION COURSES

(Listed by Program)

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### ARCHITECTURAL DRAFTING

**AD-191. BASIC ARCHITECTURAL DRAFTING.** Twenty hours a week.

This course is designed to give the beginning student a foundation in the pictorial presentation of objects along with a survey of the basic materials used in the construction industry. The content includes linework, lettering, orthographic and isometric projections, and freehand sketching. Approximately three hours a week will be devoted to the study of materials and methods of construction including soils, concrete, metals, wood, masonry and plastics.

**AD-192. INTERMEDIATE ARCHITECTURAL DRAFTING.** Twenty hours a week.

A continuation of AD-191 with emphasis upon perspective drawings, shades and shadows, and the graphic presentation of architectural concepts to facilitate comprehension. Combined with this is a three hour a week study of interior and exterior building materials such as flooring, wall surfaces, ceiling materials, roofing, protective coatings and miscellaneous building specialties.

**AD-193. PRELIMINARY DRAWINGS.** Twenty hours a week.

Application of the previous two quarter's work to specific building problems and their presentation in an intelligible manner together with a study of the elements of visual design as it may be applied to building design.

**AD-243. ARCHITECTURAL AND CONSTRUCTION PRACTICE.** Three hours a week.

A study of architectural office procedure and organization, construction methods, cost analysis and estimation. Prerequisite: Completion of 5th quarter of Architectural Drafting.

**AD-251. ARCHITECTURAL HISTORY.** Three hours a week.

An analytic study of Architectural development, past and present, in terms of the influence wielded by environment and culture. Prerequisite: Design Analysis.

**AD-252. STRUCTURAL ANALYSIS I.** Four hours a week.

A study of the fundamentals of equilibrium, strength of materials, and analysis of structural frames and members. Prerequisites: Materials of Construction I, G-111 Electricity, Sound and Light and G-106 Technical Mathematics or equivalent.

**AD-253. STRUCTURAL ANALYSIS II.** Three hours a week.

An introduction to the design of structural members in steel, reinforced concrete and wood. Prerequisite: Structural Analysis I.

**AD-258. SPECIFICATIONS.** Two hours a week.

A study of the organization and preparation of legal documents and architectural specifications required in building construction. Prerequisites: Communication III, Everyday Law, Materials of Construction II, Working Drawings I.

**AD-259. DESIGN FUNDAMENTALS.** Four hours a week.

A course including a study of theory of design, space relations, color harmony, materials and textures. Includes an introduction to presentation methods and architectural rendering. Prerequisite: Completion of 4th quarter of Architectural Drawing.

**AD-291. WORKING DRAWINGS I.** Twenty hours a week.

Students prepare complete working drawings for a small building type. Typical problems involve residential, light commercial, motel and small school.

**AD-292. WORKING DRAWINGS II.** Twenty hours a week.

Students prepare complete working drawings for a moderate-sized building type. A school, community center and church are typical problems.

**AD-293. WORKING DRAWINGS III.** Twenty hours a week.

Preparation of complete working drawings for a large-sized building type such as an apartment house, office building, department store or multi-story building.

**AUTO BODY AND FENDER REPAIR AND PAINTING****B-161. BODY SHOP.** Twenty-five hours a week.

Topics covered in basic theory include such subjects as shrinking, stretching, leading, etc. The use of the different hand tools and power tools is demonstrated and practiced. Actual work experience begins on live cars on fender and panel jobs covering repair of minor damage. Shrinking, leading, and the application of basic hammer and dolly techniques are stressed.

**B-162. BODY SHOP.** Twenty-five hours a week.

The construction, operation, and repair of the spray gun and equipment are covered. The care and use of the spray gun are thoroughly discussed including adjustments and proper spray technique, by demonstration and practice on panels and live cars. Methods of mixing paints are taught

with emphasis on tinting and matching. Both enamel and lacquer are used and their advantages and disadvantages regarding spot repair and overall refinishing are included.

**B-163. BODY SHOP.** Twenty-five hours a week.

Actual work experience on live cars is continued progressing into repair of a more serious nature. Advanced phases of body alignment and panel repairs and replacement are covered.

**B-164. BODY SHOP—ALIGNMENT AND COLLISION.** Twenty-five hours a week.

This course is designed to give the student the necessary background in alignment so he can estimate and repair the front suspension of a wrecked automobile. Portable frame tools will be used during the laboratory so the student will be familiar with methods of straightening both frames and unitized bodies. Students may progress rapidly enough during this course so as to be able to use the body press. Estimating frame and front end damage will also be stressed.

**B-262. BODY SHOP.** Twenty-five hours a week.

Setting up, equipping, and operating a body shop are covered in this course. Estimating is stressed with regard to securing business from the insurance company and the car owner. Glass work is covered as well as all phases of body work and is done on a time basis. Work is on live cars.

**B-263. BODY SHOP.** Twenty-five hours a week.

In this course the student does major repair work which consists of restoring a complete wreck to original contour and finish including frame, front end, and all alignment procedures and glass work.

## AUTO MACHINE SHOP

**AM-161. AUTO MACHINE SHOP I.** Fifteen hours a week.

This course is designed to give the student adequate knowledge and skill in the following areas: fundamentals of machines, engine functions and component parts, specifications, grinding machine practice, honing and lathe operations. With this background, the student should be able to perform all necessary common machine operations on component parts of the engine.

**AM-162. AUTO MACHINE SHOP II.** Twenty-five hours a week.

This course is designed to cover the heavy machine operations or what could be called specialized machine operations. Crankshaft grinding, camshaft grinding, connecting rod reconditioning, piston turning and line boring are the featured operations for the course.

**AM-163. AUTO MACHINE SHOP III.** Twenty-five hours a week.

This course is designed to clarify precision rebuilding. This is accomplished by building an engine and performing all operations needed for

precision work. The completed engine is tested for performance on the dynamometer. Mechanical operation such as guide work, lifter service, piston service, clutch repair, as well as flywheel and ring gear service are stressed.

**AM-261. AUTO MACHINE SHOP IV.** Twenty-five hours a week.

Any automotive machinist must be able to repair or service minor ailments pertaining to the machinery he is working on. This becomes part of the student's training in this course. Auxiliary operations include tune-up, generator and starter service, regulator service, and additional time on engine rebuilding.

**AM-271. JOBBER MANAGEMENT.** Four hours a week.

All engine rebuilders are involved in parts purchasing and stock control. This course is designed to explain parts control and merchandising, supply channels, proper methods of purchasing, display and advertising facilities and parts profits.

### **AUTOMOTIVE SERVICE**

**A-153. BASIC ELECTRICITY.** Five hours a week.

This course offers instruction in fundamentals of electricity, which are applied to the theory and operation of automotive charging and starting circuits, ignition systems, dash instruments, and electrical accessories.

**A-161. BASIC AUTO.** Twenty-five hours a week.

This is an introductory course to auto mechanics designed to familiarize the student with the basic components of the automobile. Special emphasis is placed on standard driveline units such as rear suspensions, final drives and differentials, standard and overdrive transmissions. Shop work on general service jobs is closely controlled to give the student a variety of learning experiences.

**A-162. ENGINE REBUILDING.** Twenty-five hours a week.

This course offers instruction in the procedures and machine operations necessary to completely rebuild an engine. Shop work consists of the overhaul or rebuilding of a representative group of popular automotive engines. Prerequisite: A-161.

**A-164. FRONT END ALIGNMENT AND BRAKES.** Twenty-five hours a week.

Students cover terminology, nomenclature, evolution and theory of front end alignment and wheel balancing. They perform wheel and steering diagnosis and repairs on live units using the latest, most modern equipment available. Theory of operation and service procedures for the common brake operating systems is studied with practical application being made on live units.

**A-261. TUNE-UP.** Twenty-five hours a week.

Tune-up and carburetion is covered in this course. Instruction on carburetors includes the theory of operation and service procedures for single,

two, and four barrel units. The theory and service procedures for tune-up are covered with practical application being made through the use of assigned jobs on customer cars.

**A-262. AUTO TESTING.** Twenty-five hours a week.

This course is designed to develop a student so he may work as a diagnostician or tune up man. Diagnosis is stressed on actual problems and analysis sheets are filled out for cost estimation and amount of work required for good engine performance. Students receive training on up-to-date test equipment including the chassis dynamometer and ignition scopes. Prerequisite: A-261.

**A-263. AUTOMATIC TRANSMISSIONS.** Twenty-five hours a week.

A study of automatic transmissions which includes theory of operation, repair procedures, and diagnosis of malfunctions in popular types of transmission units. Classroom instruction is coordinated with practical experience in servicing customer cars.

**A-272. SERVICE MANAGEMENT.** Four hours a week.

This course is designed to give the student principles of production, types of service, costs and returns by department, general shop organization, and service records.

### HEAVY EQUIPMENT AND DIESEL REPAIR

**D-171. INTRODUCTION TO HEAVY EQUIPMENT.** Twenty-five hours a week.

This course introduces the student to the various types of equipment and covers the extent of maintenance work required of a heavy equipment mechanic. Gasoline engines are studied with the basic course centered on small air cooled and liquid cooled engines. The application of these engines to heavy equipment is stressed. Practical applications will be made whenever possible during the laboratory period.

**D-172. HEAVY EQUIPMENT REPAIR I.** Twenty-five hours a week.

This course offers practical application of material covered in the previous quarter. The application of shafts, bearings, gears and sprockets for accessory drives of heavy equipment and use of special heavy duty pullers will be included in the laboratory period. During this quarter electrical accessory units will be studied, tested and repaired.

**D-173. HEAVY EQUIPMENT REPAIR II.** Twenty-five hours a week.

This course includes a study of air and hydraulic controls with special emphasis on their applications to heavy equipment and heavy duty trucks. Power control units will include hydraulic brakes, air brakes, hydraulic cylinders, and air controlled units. A study will also be made of driveline power transmission units including coverage of standard and multiple speed transmissions, final drives and differential units.

**D-174. PREVENTIVE MAINTENANCE.** Twenty-five hours a week.

This course stresses the importance of preventive maintenance as applied to heavy equipment and fleet operation. The use of electrical test equipment and scheduling of maintenance activities to prevent breakdown and to keep equipment operating at peak efficiency will be the core content of this course. The student will have an opportunity to operate equipment available and perform preventive maintenance services as scheduled.

Manufacturers manuals and lubrication guides will be studied and used as references.

**D-261. DIESEL ENGINES I.** Twenty-five hours a week.

Students study and work on diesel engines in the laboratory. Ratings and engine performance are stressed, as are the construction and operating features. Rebuilding and trouble shooting are also covered.

**D-262. DIESEL ENGINES II.** Twenty-five hours a week.

The diesel fuel, cooling and lubricating systems are studied. Fuel injection is stressed and the rebuilding of injectors, nozzles and pumps. The various injection equipment is disassembled and tested on special machinery designed for this purpose.

### MACHINE TOOL

**MT-161. BASIC MACHINE TOOL I.** Twenty hours a week.

The basic machine tool course includes five hours per week of class room instruction and 15 hours per week of basic machine tool operation. Also included is the basic bench work such as hacksawing, filing, simple layout, hand reaming, hand tapping, sweating, lapping, and scraping. This course covers the construction, nomenclature, care and use of the basic machine tools of industry. These tools include: drill press, engine lathe, milling machine, and shaper. A major part of the shop time is devoted to the operations performed on the basic machine tools. During this basic course the various tools used for measurement are also studied and used.

**MT-162. MACHINE TOOL II.** Twenty hours a week.

This program is a continuation of work on the basic machine tools and includes advanced work on the shaper and milling machine. Shaper operations include methods of clamping work, various shaper operations such as "T" slots, angular work, vertical shaping, etc. The work progresses on the milling machine to include milling machine attachments, types of milling machine cutters, and work-holding devices. The course also includes the analysis of milling machine jobs, and safety precautions for milling operations. The construction and use of the dividing head receives considerable attention.

**MT-163. MACHINE TOOL III.** Twenty hours a week.

Advanced work in the tool room machine tool area is stressed and grinding is introduced. The area includes the tool post grinder for grinding operations on a lathe and basic cylindrical grinding, both straight and

tapered. A study is made of abrasives, grits, binds, and grades of grinding wheels and their application.

**MT-171. ADVANCED SHOP MATHEMATICS.** Five hours a week.

A program geared to the application of mathematics to modern shop procedures. The use of the handbook and the practical solution of machine shop mathematics problems—as apply to cutting helices, precision inspection, and the application of special formula such as thread formulas.

**MT-173. PRECISION MEASUREMENT.** Four hours a week.

A study of methods of precision measurement used in tooling and manufacturing processes. This course includes the principles of precision measurement as applied to production and quality control.

**MT-175. MACHINE SHOP METALLURGY.** Four hours a week.

A course which covers the application of metallurgical fundamentals as to the machinability of common metals, the changes that occur in metal during machining operations, and the behavior of cutting tool metals.

**MT-181. MACHINE OPERATIONS AND SET-UP.** Ten hours a week.

Lathe and grinder operation and set-up course which stresses turning, grinding, boring, and honing principles as applied to the automotive machinist trade. It includes a study of grinding wheels, cutting tools and precision measuring tools.

**MT-193. MACHINE SHOP PRACTICE I.** Five hours a week.

This is an elementary course in machine shop fundamentals which includes benchwork practice, principles of measurement, and use of small tools.

**MT-261. MACHINE TOOL IV.** Twenty hours a week.

This course includes advanced milling such as gear cutting, milling helices, high speed milling, and milling with carbides. The operation of jig borer is studied and applications made on the boring machine and vertical mills. Special emphasis is placed on tool room milling and boring procedures.

**MT-262. MACHINE TOOL V.** Twenty hours a week.

This area of instruction stresses advanced tool processes and includes other grinding processes. The grinding area includes tool grinding, cutter grinding, single point carbide grinding, carbide milling cutter grinding, and other advanced grinding problems. At this time heat treatment is stressed because of the need for heat treating ground parts. Emphasis is also placed on advanced work on the surface grinder such as angular grinding, grinding slots, form grinding and for wheel grinding.

**MT-263. MACHINE TOOL VI.** Twenty hours a week.

The sixth quarter places emphasis on production machines and production methods and includes work in the setup and operation of machines tooled for production. This includes the turret lathe and hand screw ma-

chine and also production set-ups on such machines as grinders and mills. Turret lathe work includes turning, facing, drilling, forming, forging, knurling, reaming, and cut-off. Emphasis is placed upon multiple tool turning and combined turning, drilling, and reaming operations. Grinding of form cutters is also included.

**MT-271. HEAT TREATMENT PRACTICE.** Three hours a week.

This course is planned to give the student practice in operating temperature controlled hardening, tempering, and melting equipment.

**MT-272. MACHINE DEVELOPMENT.** Two to ten hours a week.

A special course for advanced students for the development of machine tool projects, special tools, and machine modifications.

Prerequisites: MT-161, MT-162, MD-191, MD-192. The number of hours scheduled and the credit given is based upon the need of the student and the recommendation of the advisor, and is subject to the approval of the Dean.

**MT-276. MANUFACTURING PROCESSES.** Three hours a week.

The machining, forming, fabricating, fastening, finishing, and casting processes used in manufacturing today are studied in this course.

**MT-282. PRODUCTION TOOLING.** Five hours a week.

A course in methods and procedure for tooling-up basic production machines. Practice is given in planning machining sequences and types of cutting tools to be used.

**MT-291. MACHINE SHOP PRACTICE II.** Five hours a week.

This course is a continuation of Machine Shop Practice I and includes in addition, elementary lathe and milling machine operations. Prerequisite: Machine Shop Practice I.

**MT-292. MACHINE SHOP PRACTICE III.** Five hours a week.

This course is a continuation of Machine Shop Practice II and includes in addition, shaper, grinder, and contour saw operations. Prerequisite: Machine Shop Practice II.

**MT-293. PRODUCTION PRACTICES.** Five hours a week.

A course in fundamental production operations employing multiple tooling, jigs, and fixtures, in conjunction with basic production machines. Prerequisites: Machine Shop Practice I, II, III.

## MECHANICAL DRAFTING

**MD-142. TECHNICAL DRAFTING.** Four hours a week.

This course is designed to develop the basic concepts of lettering, free hand sketching, orthographic projection, use of instruments and blueprint reading. An introductory course in drawing and blueprint reading for refrigeration, heating and air conditioning students.

**MD-161. BASIC MECHANICAL DRAFTING.** Twenty hours a week.

This is a laboratory-lecture course and includes 17 hours of drafting practice and three hours of drafting theory directly related to the laboratory work. It is designed to develop the manipulative skills needed for lettering, free-hand sketching, the use of drafting instruments and drafting room practices. The basic theory of orthographic projection is stressed. Models are frequently used in order that the student may visualize more clearly the projects being drawn.

**MD-162. ADVANCED MECHANICAL DRAFTING.** Twenty hours a week.

This is a laboratory-lecture course and includes 17 hours of drafting practice and three hours of drafting theory directly related to the laboratory work. This course is primarily designed to further strengthen and enlarge upon the basic concepts thus far developed in basic drafting. Proper methods of dimensioning, specifying notes and technical information relating to detail drawing, assembly drawing and machine parts are actuated.

**MD-163. BASIC JIG AND FIXTURE DETAILING.** Twenty hours a week.

This is a laboratory-lecture course and includes 17 hours of drafting practice and three hours of drafting theory directly related to the laboratory work. It is designed to bring out the fundamentals of tools, jigs, and fixtures. Standard parts such as clamps, washers, keys, locating pins, etc. are given their proper perspective in relation to tools, jigs, fixtures, and their detailing. It also broadens the student's background with the use of actual drill jigs, and milling fixtures which are drawn as assemblies and detailed into working drawings. Practice is given in incorporating engineering changes in existing tool drawings.

**MD-173. BASIC METALLURGY.** Two hours a week.

A lecture course covering steel classifications, designation of types, heat treatment, critical points, hardening, drawing, case hardening, and hardness testing of steel—Rockwell, Brinell, and Schleroscope.

**MD-174. WELDING DRAFTING.** Four hours a week.

This course is a practical mechanical drafting course which includes simple blueprint reading. Special emphasis is placed on pipe and angle layout, and template making of these structures.

**MD-181. TECHNICAL DRAFTING.** Four hours a week.

A course in sketching and plan reading based upon the needs of students enrolled in the Electronic Servicing curriculum. This course stresses drafting techniques as applied to drawing schematic diagrams. Also included is the reading of architectural plans to make it possible for the technicians to interpret these plans for the installation of systems in new construction.

**MD-182. SHEET METAL DRAFTING.** Four hours a week.

A basic sheet metal drafting course in lay-out. This course must precede the sheet metal shop course and is offered to refrigeration and air conditioning students. It includes the development of the many and varied cylindrical, square, and conical fittings and the many types of transitional fittings used in the refrigeration and air conditioning field.

**MD-191. MACHINE TOOL DRAFTING I.** Four hours a week.

This is a laboratory-lecture course which includes three hours of drafting practice and one hour of drafting theory. This course is intended primarily to survey the fundamentals of blueprint reading and their interpretation. A general orientation of working drawings as applied to the machine shop with emphasis on relationships of views and dimensioning, correct interpretation of scales measurement and tolerance, application and the interpretation of symbols and notes. Included is a study of pictorial representation for the machinist with emphasis on isometric and oblique drawings.

**MD-192. MACHINE TOOL DRAFTING II.** Four hours a week.

This is a laboratory-lecture course which includes three hours of drafting practice and one hour of drafting theory. This course covers the basics of elementary projection and dimensioning with emphasis on the proper and accurate use of drawing tools, geometrical construction, principles of drafting as applied to two-view and three-view drawings. The projection and dimensioning of cylindrical and complex shapes.

**MD-193. MACHINE TOOL DRAFTING III.** Four hours a week.

This is a laboratory-lecture course which includes three hours of drafting practice and one hour of drafting theory. Drafting mechanical standards with an industrial drawing application is included. Special consideration of dimensioning of precision measurements, tolerances, finishes, and standard notations, the proper practices of revolving out of position, line elimination, sectioning, and drawings of castings, forgings and machine stock.

**MD-194. MACHINE TOOL DRAFTING IV.** Four hours a week.

This is a laboratory-lecture course which includes three hours of drafting practice and one hour of drafting theory. Advance projection is designed to further strengthen and enlarge upon the basic concepts of basic drafting. This course deals with "identification" of (1) sub titles, (2) title blocks, and (3) bills of material, symmetrical opposite parts, auxiliary projection, and simple assembly drawings with standard post application.

**MD-195. THEORY OF WELDING FABRICATION PROCESSES.** Two hours a week.

This course incorporates theory and practical demonstrations on types and processes of welding, joint design, welding symbols, and inspection and testing in a manner to provide the Mechanical Drafting student with an understanding of the field of welding as related to his field of study.

**MD-261. JIG AND FIXTURE LAYOUT AND DESIGN.** Eighteen hours a week.

This is a laboratory-lecture course and includes 15 hours of drafting practice and three hours of drafting theory directly related to the laboratory work. The layout of drill jigs and milling fixtures from actual shop sketches are formulated into assembly drawings. These assembly drawings in turn are transposed into working drawings with proper dimensions and notes.

**MD-262. DIE LAYOUT AND DESIGN.** Nineteen hours a week.

This is a laboratory-lecture course and includes 16 hours of drafting practice and three hours of drafting theory directly related to the laboratory work. The layout and design of simple blanking, forming, and piercing dies is actuated by the use of actual shop sketches and dies.

**MD-272. GEARING.** Three hours a week.

A basic 21-hour lecture, 10-hour laboratory course on types of gears, their uses, advantages and disadvantages—figuring speeds or number of teeth for spur, bevel, rack, lead screw and worm and wheel in both simple and compound gearing nomenclature and calculations of the spur and bevel gear and tooth parts.

Types of indexing and figuring simple indexing—demonstration of tool-room and production gear shaper-cutting of gears.

**MD-282. MECHANICS AND STRENGTH OF MATERIALS I.** Three hours a week.

The following topics are covered: Forces, components, resultants, and equilibrants—parallelogram of forces and force polygons—free body diagrams—moments of force and reactions—laws of equilibrium—equilibrium of shafts stress and strain in compression, tension and shear—modulus of elasticity. Prerequisites: G-104 and G-112, or equivalent.

**MD-283. MECHANICS AND STRENGTH OF MATERIALS II.** Three hours a week.

A continuation of Mechanics and Strength of Materials, MD-282. The following topics are covered: centroids, moments of inertia and section modulus of sections—transfer formula—shearing stress and diagrams, and bending moments and diagrams in beams—moving loads bending stress, the flexure formula and design of beams—combines tension or compression and bending stress. Prerequisite: MD-282.

**MDD-263. ADVANCED DIE DESIGN.** Twenty hours a week.

This is a laboratory-lecture course including 17 hours of drafting practice and three hours of drafting theory directly related to the laboratory work. This course covers the design of more complex dies such as draw, cam action and special purpose dies as well as a more advanced study of what actually happens to the metal itself in the die operations.

**MDJ-263. ADVANCED JIG AND FIXTURE DESIGN.** Twenty hours a week.

This is a laboratory-lecture course and includes 17 hours of drafting

practice and three hours of drafting theory directly related to the laboratory work. This course gives the student experience in designing various types of jigs and fixtures such as simple drill templates, simple angle plate milling fixtures and more complex tools of industry.

## PRINTING

### **P-142. INK AND COLOR.** Two hours a week.

A theory course to acquaint students with the effective use of color, the matching of ink to design, paper and printing processes. Correct nomenclature and composition of inks.

### **P-161. HAND COMPOSITION.** Eighteen hours a week.

An introductory course which includes fundamentals of type styles, type families, type metals, equipment, printing processes, printer's measure, proofreading, and shop safety. Fundamentals of setting type by hand, operation of composing room equipment, type identification, spacing materials, location and care.

### **P-162. BASIC LETTERPRESS.** Twenty hours a week.

Practice and theory which includes the principles of imposition, lock-up of single and multiple page forms, care of presses, rollers and stock. Lock-up of forms for presses and platen press feeding on live jobs. Stock cutting, principles of bindery machines, their operation and maintenance.

### **P-163. PHOTOMECHANICAL REPRODUCTION** (Camera work, platemaking, photo-engraving). Twenty hours a week.

Instruction and laboratory practice in use of the process camera for line and halftone work for lithography. Instruction in the basics of photo-engraving, offset platemaking and black and white stripping.

### **P-171. FUNDAMENTALS OF LAYOUT AND DESIGN.** Four hours a week.

A basic course in art fundamentals as they apply to advertising for students in Printing Arts, including: a study of the elements of design, the tools and methods used by the artist, and practical work in advertising layout.

### **P-172. PRINTERS MATHEMATICS.** Three hours a week.

Designed to give the student in printing a knowledge of mathematics as applied to practical printing problems. A short review of basic mathematics is included to enable the student to deal with the technical application of problems to the printing industry. Prerequisite: G-101 or equivalent.

### **P-173. SCIENCE FOR PRINTERS.** Five hours a week.

A lecture and laboratory course involving the fundamental principles of science as applied to the printing process. The course includes studies of the chemical content and physical characteristics of ink, paper, varnishes, rollers, printing metals, adhesives, lubrication and other materials and processes used in the printing industry. (3+2)

**P-261. OFFSET PRESSWORK.** Twenty hours a week.

Includes the theory of planography and operation of the offset duplicator and offset press. Instruction, demonstrations, and practice in the proper use of etches, gums, and solvents.

**P-262. MACHINE COMPOSITION.** Twenty hours a week.

Practical experience and theory which includes care, maintenance and operation of slug casting machines, including keyboard layout and fingering, work practice, word division, straight matter composition, news composition, simple tabular work and proofreading.

**P-294. ADVANCED SHOP PRACTICE.** Twenty hours a week.

Supervised shop practices in that branch of the printing industry in which the student wishes to specialize. Scheduled by arrangement with the coordinator of the department.

**P-351. ESTIMATING I.** Five hours a week.

Covering the function of estimating; also detailed practice in estimating time, labor and materials, according to the P.I.A. Instruction Manual and Hoch's Estimating Standards for Printers. Instruction, demonstrations, work practice in the proper use of the Franklin Catalog.

**P-361. PRINTING PRODUCTION MANAGEMENT.** Twenty-three hours, or more by arrangement with instructor.

Discussion of shop problems, production and quality control in the shop. Study of production practices as suggested by P.I.A. Manual of Printing Production Management.

**P-362. MANAGEMENT AND SUPERVISION.** Thirty hours a week.

A lecture and shop course which includes supervisory activities of the entire print shop. Job scheduling, routing and record keeping. Study of records and inventory methods. Training in operation of control board and control devices. Students become familiar with supervisory responsibilities. A minimum of 30 hours a week is required.

**P-372. ESTIMATING AND COST ANALYSIS.** Five hours a week.

A continuation of P-351 with emphasis on estimating of offset lithography and finishing operations. Including cost analysis to determine how to establish cost centers, overhead and supervisory costs. Prerequisite: P-351.

**P-381. NEWSPAPER PRACTICE.** Four hours a week.

Content covers the legal history and principles underlying freedom of the press; study of statutes, case laws and federal regulations; editorial ethics, practices, procedures, policies and problems, with emphasis on application at the management level.

**RADIO-TELEVISION SERVICE****ES-161. BASIC ELECTRONICS.** Twenty hours a week.

The theory program devoted to five hours per week includes safety, theory of communications, radio waves, wave lengths and radiation charac-

teristics, Ohm's law and the RETMA color code of resistor and capacitor value, component symbols and schematic diagram reading and the use of service manuals, the study of d-c circuits, resistance calculations, capacitive and inductive reactance, resonance response curves, r-c networks, transformers, vacuum tubes, impedance matching, the use of multimeters, and the design of rectifier and class A, B, and C amplifier circuits.

The shop program carried on for the period of 15 hours per week includes projects assigned to the student concerning the following: shop safety practices, fusing, care and use of tools, soldering techniques, wire splicing, component identification, batteries, radio dial mechanism, capacitance measurements, inductance measurements, transformer testing, circuit wiring and testing, vacuum tube characteristic curve development, testing and replacing vacuum tubes, construction analysis, and testing of rectifier and amplifier stages.

**ES-162. ELECTRONIC CIRCUITS.** Twenty hours a week.

Five hours per week devoted to a study of circuits and stages which will include the following: power supplies; audio-frequency amplifiers; detectors; radio-frequency amplifiers; oscillators; automatic volume control; discriminators; ratio detectors; intermediate-frequency amplifiers; limiters; converters; and auto radio circuits including signal seeker circuits. 15 hours of actual laboratory or practical experience includes the construction, analyzing and testing of radio stages. Also included are shop operations pertaining to the servicing of speakers, power amplifiers, detectors, converters, voltage amplifiers, intermediate-frequency amplifiers, radio-frequency amplifiers, and antennas.

**ES-163. RADIO SERVICE.** Twenty-five hours a week.

The theory program for five hours per week will include study of radio assemblies with class demonstrations; chassis layout of home, portable, auto and communication radio receivers; service instruments and application; point-to-point testing, voltage and resistance reading interpretation; alignment methods including visual alignment with an oscilloscope; preventive maintenance. Shop experience includes 20 hours per week on projects which include practical application of various types of test equipment used for trouble shooting radio receivers and allied electronic equipment. Common and special trouble shooting techniques are practiced with all types of equipment; such as, audio and r-f generators, oscilloscopes, multimeters, signal tracers, frequency meters, distortion meters, intermodulation analyzers. Resistor capacitor checkers, tube testers, selenium rectifier testers, and other types of equipment are also employed while trouble shooting.

**ES-171. BASIC ELECTRONICS.** Five hours a week.

A course designed to provide the student with an understanding of basic electronics. Information required for understanding electronic controls, including vacuum tubes, amplifier circuits, time-constant circuits, resonant circuits, oscillators, multivibrators, rectifiers, and other component parts.

**ES-173. RADIO MATHEMATICS.** Five hours a week.

This five hour a week course includes the use and application of logarithms in the solution of problems concerning sound, antennas, and transmission lines. Application is made of trigonometry for the solution of alternating current circuits, series and parallel resonance, impedance, reactance, and current-voltage phase angles.

**ES-261. BASIC TELEVISION.** Twenty hours a week.

The theory—five hours per week—covers fundamentals of the transmission of audio and video signals in the television system. Topics are: safety precautions, the audio portion of the television receiver, the composite video signal, picture carrier modulation, the picture tube, scanning and synchronization, television low and high voltage power supplies, and video amplifier stages.

Laboratory projects include picture tube handling, setting-up and basic adjustments of the television receiver, chassis and picture tube removal and installation, cabinet care, construction, analysis, testing, and simple trouble shooting in the audio section, power supply, picture tube circuits and video amplifier stages, sound IF alignment is practiced. The erection and installation of antennas including the use of rotors is practiced. Signal strength measurements are made using different types of antennas.

**ES-262. TELEVISION CIRCUITS.** Twenty-five hours a week.

The theory aspect of this five hour course includes the study of the following: brightness control and d-c reinsertion circuits, video detector stages, automatic gain control circuits, synchronization separator and amplifier stages, deflection oscillator and amplifier stages, automatic frequency control circuits, picture IF amplifier stages, and RF tuner units. Sweep and marker generator applications in the alignment of the IF sections and VHF-UHF tuners are studied. Actual shop work for 20 hours per week is on projects which include construction, analysis, testing, and simple troubleshooting of the stages studied during the theory lecture time. Oscilloscope application for waveform testing and peak to peak measuring in the deflection and video section for troubleshooting purposes is performed. Visual alignment is practiced. Adjustments of horizontal automatic frequency control and automatic gain control circuits are also performed.

**ES-263. TELEVISION SERVICE.** Twenty-five hours a week.

Troubleshooting the complete television receiver is the major element in this course. The theory lecture is used to study methods of trouble locating and the application and function of the following test instruments: vacuum tube voltmeter, oscilloscope, sweep and marker generators; crosshatch generator, voltage calibrator, isolation transformer, et cetera.

Other subjects are receiver installation problems, picture interference analysis, VHF-UHF antenna and transmission line theory, antenna distribution systems, camera tubes, and studio setups, advanced circuit design in stages like the video amplifier, noise suppressors, remote control units, et cetera. Discussions of service problems are held.

Laboratory work is concentrated on performance checks. Diagnosis and repair of faulty receivers is undertaken on many makes of television receivers. Complete visual alignment procedures including AFC and AGC adjustments are performed. Home service calls are practiced.

**ES-361. COLOR TELEVISION.** Twenty-five hours a week.

This is an advanced theory course and is designed to introduce color television to the technician now working in black and white television service or to persons who have completed the six preceding quarters in the Radio-Television Service program.

The study is centered on the NTSC color television system. Study starts with the basic theory of color transmission followed by the practical chrominance circuit design and includes localizing troubles in the color receiver. Also included is a short section on the latest troubleshooting techniques specially designed for technicians with some experience in black and white television servicing. Twenty hours per week are devoted to installation and adjustment of the color receiver, troubleshooting of chrominance circuits such as: color sync circuits, chrominance bandpass amplifier stages and detector circuits, matrix network, etc. on live program and color generator. Also included is some troubleshooting in black and white television receivers using advanced techniques.

### TRANSMITTER SERVICE

**TS-263. BASIC TRANSMITTER SERVICE.** Twenty-five hours a week.

Five hours per week of theory which includes safety procedures, theory and operation of transmitter circuits such as: oscillators, VFO's, frequency multipliers, buffer amplifiers, voltage amplifiers, power amplifiers, AM and FM modulator circuits, and antenna systems. The laboratory projects include testing, analyzing, and repair of transmitter circuits. Adjustment of stages using different indicating instruments and procedures, frequency measurement and modulation measurement are included.

**TS-273. COMMERCIAL RADIO REGULATIONS I.** Two hours a week.

This two hour per week course is concerned with the rules and regulations of the Federal Communications Commission pertaining to commercial radio and television operation. Various regulations are interpreted.

A knowledge of the commercial radio rules and regulations is necessary for FCC license preparation.

**TS-361. ADVANCED TRANSMITTERS.** Twenty-five hours a week.

The theory class is five hours per week and includes: advanced transmitter circuit servicing techniques and stage adjustments. Radio broadcast transmitters, control boards, transcription turntables, pre-amplifiers, peak limiters, modulation monitors, frequency monitors, television transmitters and antenna systems are studied.

Laboratory projects include advanced techniques of analyzing, testing, servicing, and adjustment of transmitter circuits. Audio distortion tests are

performed as well as the numerous operation checks using modern test equipment.

**TS-371. ANNOUNCING.** Five hours a week.

This five hour per week course deals with the various aspects of radio announcing. Proper news delivery, expressive commercials delivery, and delivery of written script shows are some of the types of announcing that are undertaken. Off-hand delivery and ad-libbing techniques are included.

**TS-381. COMMERCIAL RADIO REGULATIONS II.** Two hours a week.

A continuation of the course on Federal Rules and Regulations necessary for First Class Commercial Radiotelephone License. This is advanced radiotelephone law.

## REFRIGERATION — HEATING, AND AIR CONDITIONING

**R-161. BASIC AND DOMESTIC REFRIGERATION.** Twenty hours a week.

Five hours of classroom lecture; fifteen hours of demonstrations, calculations, and problems co-ordinated with laboratory operations and tests. The first quarter includes the theory and application of the basic principles of refrigeration, the function and operating characteristics of the various parts of the refrigeration units. Study of the design and theory of condensers, receivers, evaporators, refrigerant controls and the common refrigerants is included; also the use of testing equipment, safety and protective devices. The lecture program is correlated with practical problems presented in the shop.

**R-162. REFRIGERATION.** Twenty hours a week.

Five hours of classroom lecture; fifteen hours of demonstrations, calculations and problems coordinated with laboratory operations and tests. The second quarter includes theory, application and operation of expansion valve, float valve, and capillary tube systems; thermostatic and pressure motor controls. Methods of complete refrigeration overhauling and testing procedures. Charging and discharging systems with refrigerant and oil; testing for refrigerant leaks, testing hermetic units, relays and overload devices; diagnosing troubles, repairing and testing.

**R-163. COMMERCIAL REFRIGERATION.** Twenty hours a week.

Five hours of classroom lecture; fifteen hours of demonstrations, calculations and problems coordinated with laboratory operations and tests. This course is devoted to disassembling, assembling, adjusting, operating and testing compressors, valves and controls used in commercial refrigeration, as well as troubleshooting, repairing and servicing commercial installations. Operating and testing low and medium temperature, multiple and other systems and the use of hot gas and electric defrost methods. Training is given in layout and estimating complete refrigeration installations, in-

cluding wall construction, calculating heat gains, selecting and sizing condensing units, evaporative condensers, water towers, cooling coils, valves, controls and lines. Working drawings and reports are made and the slide rule is used for calculations.

**R-181. AUTOMOTIVE AIR CONDITIONING.** Four hours a week.

A course planned to teach automotive service students the principles of refrigeration. On cars equipped with air-conditioning units it is often necessary to remove the air-conditioning unit in order to service other units of the automobile.

**AC-142. SHEET METAL.** Four hours a week.

A laboratory lecture course that includes three hours of shop practice and one hour of lecture and discussion. This course is designed for refrigeration, heating and air conditioning students which includes the basic elements of sheet metal work as applied to the design and construction of heating and cooling ductwork.

**AC-171. ELECTRICAL CIRCUITRY AND CONTROLS.** Five hours a week.

This course is designed to provide a background of the theory of operation, application and installation of electrical control circuits and control devices used in the refrigeration, air-conditioning and heating industry. Basic control circuits are combined in various ways to produce control of motors used on heating and air-conditioning equipment. The laboratory work includes experimental investigation of many typical control circuits used in industry. Prerequisite: G-111.

**AC-261. AIR CONDITIONING.** Twenty hours a week.

Five hours of classroom lecture; fifteen hours of demonstrations, calculations and problems co-ordinated with laboratory operations and tests. The fourth quarter offers basic principles, practices and operation of air conditioning equipment for cooling. The use of the sling psychrometer, anemometer, and other instruments is applied with the study of the psychrometric chart, air and steam tables. Class work and lecture demonstrations include calculations for heat gains, properties of air, the gas laws, etc. Laboratory work includes operating, testing and troubleshooting the various types of air conditioning equipment.

**AC-262. HEATING.** Twenty hours a week.

Five hours of classroom lecture; fifteen hours of demonstrations, calculations and problems coordinated with laboratory operations and tests. This program offers basic training in the fundamentals of heating. The course includes a study of the three basic heating systems; warm air, hot water and steam. Also included is the study of stokers, oil burners, filters, registers and heat transfer units. Problems in heat loss calculations for residential and commercial installations together with the selection and sizing of heating systems. Laboratory work includes the installation, operation, testing and trouble-shooting of the various types of heating equipment together with the electric and pneumatic controls needed for operation.

**AC-263. ADVANCED HEATING AND AIR CONDITIONING PROBLEMS.** Twenty hours a week.

Five hours of classroom lecture; fifteen hours of demonstrations, calculations and problems coordinated with laboratory operations and tests. This course includes the study of air distribution and duct design which covers the requirements of fans, filters, diffusers, ventilation systems, noise control and the necessary electric or pneumatic controls for their operation. Also included is a study of insulation materials; chimneys, flues and fireplaces; other heating and cooling systems; and alternate methods of calculating heat gains and heat losses. Laboratory work includes the use of pitot tube, anemometer, manometer and draft gauge in checking the various duct systems for heating and cooling operations. Other laboratory problems will consist of duct construction, applications of fan performance under various conditions and diagramming and testing various wiring situations.

**VISUAL REPRODUCTION TECHNICIAN****VR-143. INTRODUCTION TO PHOTOGRAPHY.** Three hours a week.

A basic theory course consisting of lectures and demonstrations dealing with the elements of photography. An elementary course in cameras and photographic materials to give the student the background required for copy work.

**VR-152. VISUAL AIDS PREPARATION AND USE.** Four hours a week.

A course covering the planning, construction, and effective use of visual aids in instructional materials and commercial displays. Techniques of preparing and presenting visual materials. Special attention is given to planning quality reproduction of individual projects. Use and care of projection equipment including motion picture, slide, opaque, and overhead projectors are emphasized.

**VR-161. BLUEPRINT AND DIAZO REPRODUCTION TECHNIQUES AND THEORY.** Fifteen hours a week.

A basic course in the use and theory of blueprint and diazo materials and equipment. Operation and maintenance of equipment, and handling and storage of materials are stressed. Industrial procedures using commercial standards are followed in the instruction given in production shop environment. Accompanying theory, demonstration and lecture emphasize a study of materials, equipment, techniques, and other elements affecting quality.

**VR-163. PHOTOCOPY AND DARKROOM TECHNIQUES.** Fifteen hours a week.

A course enabling the student to acquire, under actual shop conditions, basic techniques in various methods of copy making with materials requiring darkroom conditions. Operation and maintenance of stat cameras, vacuum frames and similar types of equipment are stressed.

**VR-171. SURVEY OF VISUAL REPRODUCTION PROCESSES.** Three hours a week.

A non-technical survey through lectures and demonstrations to orient the student in the major reproduction processes used in industry. Special emphasis is given to familiarize the student with the various reproduction processes, equipment and materials and the characteristics and specific values of each in the visual communications field.

**VR-172. INDUSTRIAL RECORDING, FILING, AND CODING.** Two hours a week.

Systems of recording, coding, and filing engineering drawings and similar materials. Care and storage of original drawings, preparation and uses of intermediates.

**VR-181. MECHANICAL DRAWING TECHNIQUES.** Five hours a week.

Practice in drawing techniques and in the use of mechanical drawing equipment as applies to the Visual Reproduction technician. Use of drawing instruments, pencil and inking techniques, mechanical lettering devices, templates and special processes and equipment as used by the draftsman.

**VR-232. SHOP OPERATIONS – PROBLEMS AND PRACTICE.** Three hours a week.

Classroom study of the operation of commercial and industrial type shops. Emphasis is placed on planning, work flow, inventory control, material handling, shop conditions and safety.

**VR-243. REPRODUCTION ESTIMATING AND COST FINDING.** Three hours a week.

Instruction and practice in selecting the appropriate reproduction process, the scheduling of work, and the estimating of customer and shop costs. Elements of cost analysis procedures are included in the instruction.

**VR-261. MICROFILM AND ADVANCED DARKROOM TECHNIQUES.** Twenty hours a week.

A course in operation and maintenance of equipment used in microfilming and related areas of blowblacks, and advanced techniques in processing negatives where high quality is required or original copy is substandard. Sample negatives, retouching techniques, and opaquing are included.

**VR-262. PROCESS CAMERA WORK AND PLATE MAKING.** Twenty hours a week.

Camera work with practical experience on production jobs, including both line and halftone work. A variety of experience in enlargements and reductions, preparation of glass slides, and negatives and various type plates for offset printing, and use of these plates on offset machines.

**VR-265. XEROGRAPHY-ELECTROSTATIC COPYING AND OFFSET REPRODUCTION.** Fifteen hours a week.

A basic course in the use and theory of electrostatic copying and offset duplicating equipment in a practical production-shop situation. Course

includes care and maintenance of equipment, preparation of masters for duplicating machines, selection, preparation, care and storage of all types of offset plates. Study of inks, papers, plates and chemicals used in offset process, and preparation of translucent intermediate of electrostatic equipment for diazo type equipment.

**VR-266. PRINTING ORIENTATION.** Two hours a week.

A semi-technical lecture and discussion on graphic arts applications in printing, including letterpress, offset, gravure and silk screen processes. Includes a study of where each of these fit into the whole reproduction field, and includes a background discussion of typesetting procedures and plant visitation to our own printing plant.

**VR-267. ADVANCED REPRODUCTION TECHNIQUES.** Fifteen hours a week.

An advanced course devoted to more intense study of previous processes; special techniques such as template work, precision negative work and special engineering and business systems applications; and the latest techniques as found in the industry.

**VR-268. REPRODUCTION MANAGEMENT.** Five hours a week.

Principles and practices of management are studied by lecture and discussion, with particular emphasis on practical applications, including production, inventory control, purchasing, reproduction plant billing and pricing procedures, and problems peculiar to both in-plant and commercial blueprint and allied reproduction plant operations.

**VR-271. PHOTOGRAPHIC THEORY – CAMERAS AND PLATE MAKING.** Five hours a week.

Classroom study of some of the more specialized applications of photography: process cameras, loft cameras, offset platemaking and template making.

**VR-272. PHOTOGRAPHY FOR REPRODUCTION PROCESSES.** Three hours a week.

Classroom study of the more advanced phases of photographic theory, chemistry, lens and darkroom techniques with emphasis on the processes used in engineering and commercial reproduction.

## WELDING

**W-141. BASIC INERT GAS WELDING.** Ten hours a week.

This course teaches the fundamentals of inert gas welding with the argon shielded arc. The basic types of joints are covered on different types of metals. The theory of other types of shielded processes is also taught at this time. Two hours of theory and eight hours of laboratory are given weekly.

**W-144. SHEET METAL LAYOUT.** Four hours a week.

A lecture demonstration course in which the basic elements of sheet metal work are studied. Part of this time is used in the layout of sheet metal problems and a study of sheet metal drafting procedures.

**W-161. BASIC OXY-ACETYLENE WELDING.** Twenty-two hours a week.

This course is designed to instruct the student in the procedures of oxy-acetylene welding and cutting. Fabrication of gas-welded structures, position welding, and care of gas-welding equipment are included in this phase of the welding course. Approximately five hours of lecture and 17 hours of laboratory work are given in this course.

**W-162. BASIC ARC WELDING.** Twenty-five hours a week.

This course enables the welding student to use the arc welding process in fabrication of steel structures. All types of welded joints are discussed and welded in all positions. Care and maintenance of the arc welder are applied in this course. The course will include five hours of lecture and 20 hours of laboratory work per week.

**W-163. COMBINED WELDING.** Fifteen hours a week.

This is a combined welding course which gives the student experience in varied welding shop projects with oxy-acetylene and arc welding. More time is applied to horizontal, vertical, and overhead welding positions. This course includes five hours of theory and 10 hours of laboratory work per week.

**W-183. COMBINED WELDING.** Four hours a week.

This is a combined course in gas and arc welding to provide the machinist or other tradesman with enough welding experience to make repairs and to fabricate simple assemblies. Emphasis is placed on the building up of worn parts and the repair of broken parts. The use of low temperature rods is included to make the repair of machine shop tools, such as milling cutters, possible.

**W-184. COMBINED WELDING.** Four hours a week.

This is a continuation of W-183 and is a combined gas-arc course. This program is especially for the students in heavy equipment repair, and emphasis is placed on welding as used in the field of heavy equipment, such as motor transport.

**W-191. BASIC METALLURGY.** Three hours a week.

This is a three hour per week lecture course. The effect of alloys on the weld and welding procedures are the main topics of discussion. Pre-heating, post-heating, and other heat treatment procedures are also covered in this course.

**W-192. COMBINED WELDING.** Six hours a week.

A combined welding course covering gas and arc theory and practice for students needing more than the offering of W-183, particularly for the auto body and fender students.

**W-193. COMBINED WELDING.** Nine hours a week.

A continuation of W-192 with both theory and welding practice for the advanced auto body and fender student.

**W-261. ADVANCED WELDING.** Fifteen hours a week.

This course is designed to produce a more experienced welder, for more rapid advancement in the field. It includes non-ferrous welding, tool welding, alloy castings and the more intricate welding procedures and application. Welding of pressures, vessels, and pipe fabrication also is included in this course. This course is five hours of theory and 10 hours of laboratory work per week.

**W-271. ADVANCED INERT GAS WELDING.** Ten hours a week.

This course gives the student practical work in the fundamentals studied in the former quarter. It includes position welding of non-ferrous alloys, and hard surfacing with inert gas. Two hours of theory and eight hours of welding laboratory are given in this course.

## **SPECIALIZED EDUCATION DIVISION**

### **COSMETOLOGY DEPARTMENT COURSES**

**Cosmetology 101.** Five hours a week.

Theory in elementary bleaching and tinting of hair, personal hygiene, bacteriology, sanitation, chemistry of solutions, shampooing, hairdressing, permanent waving, safety measures, vocabulary, and manicuring.

**Cosmetology 102.** Twenty hours a week.

Laboratory work in manicuring, shampooing, pin curls, finger waving, sculpture curls, brushing, towel drying, maintenance of dryer, regulating temperature of water, demonstration work in permanent waving on block-head, tinting and bleaching, and sanitation.

**Cosmetology 103.** Five hours a week.

Introduction to scalp treatment, different types of shampoos and rinses, continuation of hairdressing and shapering, permanent waving, tinting and bleaching, facials, manicuring, and office records.

**Cosmetology 104.** Twenty hours a week.

Laboratory work in scalp treatments, brushing and massaging, shampooing and rinses, elementary hairdressing, tinting and bleaching, permanent waving, facials, manicuring, and sanitation.

**Cosmetology 105.** Five hours a week.

Introduction to skin, hair, nails, disorders of the skin, scalp and hair, light therapy, and theory of massage.

**Cosmetology 106.** Twenty hours a week.

Laboratory work in permanents, manicuring, shampoos and rinses, hair-dressing and shapering, tinting and bleaching, scalp treatments, facials and finger waving.

**Cosmetology 107.** Five hours a week.

Study of hair and hair shapering, cosmetics, hair tinting and bleaching, finger waving, permanents, use of specialized electrical equipment used by cosmetologists, and maintenance of dryer.

**Cosmetology 108.** Twenty hours a week.

Laboratory work in facial treatments, advanced work in permanents, finger waving, hair shapering, tinting and bleaching, cosmetics, and use of specialized electrical equipment used by cosmetologists.

**Cosmetology 109.** Five hours a week.

Review of hair tinting and bleaching, massage, manicuring, hairdressing, permanent waving, hair shapering, and office records.

**Cosmetology 110.** Twenty hours a week.

Laboratory work in advanced tinting and bleaching, permanent waving, hairdressing and finger waving, massaging, manicuring, and use of specialized electrical equipment used by cosmetologists.

**Cosmetology 111.** Five hours a week.

Professional ethics, advertising, salesmanship, beauty salon management, and State Board review.

**Cosmetology 112.** Twenty hours a week.

Practice in model shop of all branches taught, practice preparatory to taking the State Board Examination.

**R.I. 100. READING IMPROVEMENT.** No credit. Five hours a week.

A course designed for students who wish to improve reading-study skills. How to study, how to take notes, and how to outline, receive attention. Exercises are given to increase speed in reading, to improve vocabulary, and to master word attack methods. Group instruction is given, but each person studies at his own level and receives individual attention as time allows.

Open to students from any division.

## **SPECIALIZED EDUCATION DIVISION**

### **HIGH SCHOOL DEPARTMENT COURSES**

The Roman numerals with the subjects listed below indicate the courses or terms in which the subjects are offered. For instance, Algebra II indicates second term of first year Algebra; Algebra III indicates first term of

second year Algebra. It will be noted that English I is not offered. It has been found that adult students obtain sufficient rhetoric, composition, and grammar in English II, III, and IV. Each of the courses listed here allows one-half unit of credit.

**English II**

Basic grammar and punctuation.

**English III**

Grammar and composition.

**English IV**

Advanced writing.

**English V**

The pageant of American life. (The growth of a nation.)

**English VI**

The pageant of American Literature. (Men and books.)

**English VII**

A study of English Literature and the influences that acted upon it from before Chaucer to the impact of scientific thinking in the 18th century.

**English VIII**

A study of English Literature and the influences that acted upon it from the 18th century impact of science to the present day and the future outlook.

**Speech I**

The conveying of ideas orally in an effective manner. Fundamentals of parliamentary law.

**Speech II**

Group discussion and debate.

**American Government**

Form and functions of our federal and state governments and of counties, cities and villages. Throughout the course the rights and responsibilities of citizens will be stressed.

**Economics**

Economic problems and theories of the present day. Economic concepts and institutions both domestic and abroad.

**Geography**

A study of the principles of geography, and man's relationship to his physical environment. Lecture, recitation, reports, map study.

**Problems of Democracy**

Problems of education, labor unions, marriage and divorce, etc., based on government, economics and sociology.

**Sociology**

Man's relation to society and the evolution of group life and culture. Marriage, family, education. Social control.

**United States History I**

Period 1400 to 1870, from early period of exploration, including English settlements, American Revolution, Jeffersonian Democracy. War of 1812, Jacksonian Period, Mexican War, Civil War.

**United States History II**

Reconstruction to the present: Rise of business, Roosevelt and his Square Deal, reform movement 1870-1914, World War I, the great depression, Roosevelt and his New Deal, World War II, United Nations, the conflicts in Asia and the "Cold war."

**Biology I**

A study of the development of biology.

**Biology II**

A study of the life functions common to all living things.

**Chemistry I**

A beginning course covering fundamental principles: A study of some of the most important and most common elements and their compounds; problems. Laboratory. Prerequisite: One unit of algebra satisfactorily completed.

**Chemistry II**

A continuation of Chemistry I. Laboratory. Prerequisite: Chemistry I.

**General Science I**

A non-technical course covering integrated aspects of elementary physical and biological sciences: air; water; heat; weather; light; outer space; the changing earth. Discussions, demonstrations, reports.

**General Science II**

A non-technical course covering integrated aspects of elementary physical and biological sciences: work and energy; electricity; communications; transportation; plants; animals; conservation. Discussions, demonstrations, reports.

**Physics I**

Mechanics; properties of matter; heat. Prerequisite: Two terms of algebra and one term of geometry satisfactorily completed. The second term of geometry may be taken with the first term of physics.

**Physics II**

Magnetism; electricity; sound; light; electronics; nuclear study. Prerequisites: Two terms of algebra and one term of geometry satisfactorily completed. The second term of geometry may be taken with the first term of physics.

**Business Mathematics**

Application of the fundamental process of arithmetic to the field of business.

**High School Arithmetic**

A complete review of arithmetic for students who have not completed the eighth grade or who need review before starting Algebra I.

**Algebra I**

Beginning algebra including fundamental operations, equations, algebraic expressions and verbal problems. Prerequisite: Satisfactory performance in arithmetic.

**Algebra II**

Simultaneous linear equations, graphing, special products and factoring, fractions, ratio and proportion, powers and roots, and quadratic equations. Prerequisite: Algebra I.

**Algebra III**

Review of fundamentals; exponents and radicals; properties of the quadratic equation; systems of equations, determinants, graphs. Prerequisite: Algebra I and II (one unit).

**Plane Geometry I**

Theorems, exercises, construction involving angles and rectilinear figures, introduction to circles. Prerequisite: Elementary algebra.

**Plane Geometry II**

Circles, perimeters and areas of irregular and regular plane figures, similar figures, ratio and proportion, constructions. Prerequisite: Plane Geometry I.

**Solid Geometry**

Three-dimensional figures, theorems and formulae. Prerequisite: Plane Geometry.

**Trigonometry**

Plane trigonometry, graphs of functions, elementary spherical trigonometry. Prerequisite: Plane Geometry.

**Advertising**

Newspaper, magazine, outdoor, direct mail, specialty; writing of copy, layout, campaigns, appropriations, etc.

**Bookkeeping I**

Debit and credit, assets, liabilities, profit and loss, cash book, journal, sales and purchase book, ledger and trial balances, sample statements.

**Bookkeeping II**

Working sheets, accrued items, deferred charges, reserves for depreciation and restoration entries, trading profit and loss statements, statements of financial position, comparative balance sheets.

**Business English**

Practical application, grammar and punctuation, correspondence exercises, original letters.

**Commercial Law**

Fundamental principles, contracts, negotiable instruments, sales of goods, agency, partnership, real estate, personal property.

**Office Management**

Duties of the office manager of personnel, equipment and supplies.

**R.I. 100. READING IMPROVEMENT.** No credit. Five hours a week.

A course designed for students who wish to improve reading-study skills. How to study, how to take notes, and how to outline, receive attention. Exercises are given to increase speed of reading, to improve vocabulary, and to master word attack methods. Group instruction is given, but each person studies at his own level and receives individual attention as time allows.

Open to students from any division.

**Retail Selling**

Retailing from the point of view of the customer and the store manager.

**Shorthand I**

First 18 units, brief forms, vocabulary, dictation.

**Shorthand II**

Last 18 units, more brief forms, vocabulary, dictation.

**Typewriting I**

The keyboard, manual exercises, drills. 25 words per minute.

**Typewriting II**

Letters and forms; fifty to sixty words per minute.

**Typewriting III**

Production techniques and project typing with emphasis on increased accuracy and speed.

**SPECIALIZED EDUCATION DIVISION****RELATED EDUCATION COURSES****Communication Skills 51. COMMUNICATIONS I.** Three hours a week.

A course designed to achieve desirable standards of effectiveness in oral and written communication. Assignments are directed to aid the student in his chosen field of interest and help him develop attitudes and abilities which are necessary to formulate his educational goals. The fundamentals of speech are stressed to enable the student to speak with effectiveness.

**Communication Skills 52. COMMUNICATIONS II.** Three hours a week.

A continuation of Communication Skills 51 with emphasis on the basic rules of punctuation for effective written communication. Compositions dealing with student problems are written, and exercises dealing with vocabulary building, reading comprehension, and logical thinking are utilized. Business correspondence techniques are introduced.

**Communication Skills 53. COMMUNICATIONS III.** Three hours a week.

Emphasis on the development of communication skills. An increasing variety of exercises dealing with diction, logical thinking, exactness, and the nature and function of language is utilized.

**G-100. BASIC MATHEMATICS—REMEDIAL.** Five hours a week.

A complete review of arithmetic including the most elementary of fundamentals. Designed for the student who does not have the necessary elementary background and for those who need review before taking more advanced mathematics courses.

**G-101. BASIC MATHEMATICS.** Five hours a week.

A basic course in mathematics which includes a review of the fundamentals. The mathematics involved in various trade and industrial fields is presented to blend theory and practice so that the student may understand the mathematics covered.

As the student progresses in his shop work the need for mathematics becomes more apparent. Actual shop problems are used to make it possible for the average student to gain enough experience for a good foundation in this field.

**G-102. TECHNICAL MATHEMATICS (ALGEBRA).** Five hours a week.

The language of algebra, formulas and applications, positive and negative numbers, simple arithmetic with algebraic notation, equations, factoring, fractions, exponents, powers, roots and graphs.

**G-103. TECHNICAL MATHEMATICS (GEOMETRY).** Three hours a week.

Uses, definitions, constructions, axioms, proofs, rectilinear figures, the circle measurement and elementary space relations.

**G-104. TECHNICAL MATHEMATICS (TRIGONOMETRY).** Five hours a week.

Functions, logarithms, solution of triangles, and graph functions.

**G-105. TECHNICAL MATHEMATICS (SLIDE RULE).** Two hours a week.

A course for students in Trade and Industrial programs in which the use of the slide rule is a decided advantage, as in drafting, refrigeration, etc. Included in the course are problems in: Multiplication, division, combined multiplication and division, square root, areas of circular sections, cubing and cube root.

**G-106. TECHNICAL MATHEMATICS (ALGEBRA AND TRIGONOMETRY).** Five hours a week.

A course covering the topics of algebra and trigonometry which have practical application in shop subjects. Includes quadratic equations, logarithms, fundamental trigonometric functions and solution of triangles. Designed for the student who does not need all of the topics found in the regular college algebra and trigonometry courses. Prerequisite: G-102 or equivalent.

**G-107. TECHNICAL MATHEMATICS (ADVANCED ALGEBRA).**

Five hours a week.

A course covering the topics of algebra which have practical application in shop subjects. Includes quadratic equations, exponents, radicals, and fractions. Prerequisite: G-102 or equivalent.

**G-111. ELECTRICITY, SOUND AND LIGHT.** Seven hours a week.

This is a course in physics intended for Trade and Industrial students. These three areas are combined because it meets the needs of certain areas of the Trade and Industrial program. It deals with the laws of electricity, sound and light and is carried on by lectures, lecture-demonstrations and by laboratory work. The course is for three lecture hours and two two-hour laboratory periods.

**G-112. MECHANICS AND HEAT.** Seven hours a week.

This course follows the same pattern as G-111 in the field of mechanics and heat. By combining these two areas, it makes it possible for students, such as automotive students, who receive their training in electricity in their own program, to secure this vital area of physics. It deals with the laws of mechanics and heat and their practical applications.

**G-121. ADVERTISING.** Five hours a week.

A course for Trade and Industrial students covering forms of advertising as newspaper, magazine, outdoor, direct mail, specialty, etc.: Writing of copy, layout, campaigns, appropriations, etc.

**G-122. BUSINESS CORRESPONDENCE.** Five hours a week.

After a brief review of fundamentals, a complete study is made of letter forms and letter mechanics. A study is made of various types of business letters and report writing with adequate practice in writing applications, sales, adjustment, inquiry, and credit letters.

**G-124. SPECIALIZED SELLING.** Five hours a week.

To improve and develop more effective methods of selling specific items of merchandise, for example radios, television sets and automotive accessories. Each student will study and practice as his needs and interests dictate.

**G-126. TYPEWRITING I.** Five hours a week.

Manual of the keyboard through the use of manual exercises and drills. An introduction to business letter forms.

**G-127. TYPEWRITING II.** Five hours a week.

Intermediate typewriting.

**G-130. FOREMANSHIP TRAINING.** Three hours a week.

This course is intended to teach the Trade and Industrial students the duties and responsibilities of foremen and the techniques which successful foremen use. The student learns what the typical foreman does, what problems he is confronted with and how he handles them so as to accomplish the task of getting the work out. He learns why the human-relations aspect of the foreman's job is so important. The students are given an opportunity to acquire some foremanship skills through the technique of "role-playing."

**G-134. EVERYDAY LAW.** Four hours a week.

A survey course aimed at giving the technicians and tradesmen a functional knowledge of the basic legal problems that confront them in everyday law.

Special attention is given to court system, commercial paper, bankruptcy, partnership and corporations, contracts, wills, real estate, insurance, and installment buying.

**R.I. 100. READING IMPROVEMENT.** No credit. Five hours a week.

A course designed for students who wish to improve reading-study skills. How to study, how to take notes, and how to outline, receive attention. Exercises are given to increase speed of reading, to improve vocabulary, and to master word attack methods. Group instruction is given, but each person studies at his own level and receives individual attention as time allows.

Open to students from any division.

**G-136. SMALL BUSINESS MANAGEMENT.** Three hours a week.

The problems of small business operation forms, records, record keeping, tax problems, ordering and inventory.

**G-138. MANAGEMENT AND LABOR PROBLEMS.** Three hours a week.

This course is more advanced than G-130 Foremanship Training. It is intended for the student who wishes to learn about the functions of all levels of supervision and the problems that confront him and to acquire additional training in leadership skills. The human-relations aspect of supervision and the techniques used to produce beneficial human-relations is dealt with more fully. Included are a study of labor unions, their history, functions, and reasons for existence.

The classes are held on a conference-type basis, as nearly as possible, in order to secure maximum student participation. Prerequisite: G-130 or equivalent.

**Political Science 61. POLITICAL SCIENCE.** Five hours a week.

A study of the form and functions of our federal, state, county, city and village governments.

**Social Science 51. MAN AND SOCIETY.** Five hours a week.

An analytical study of selected problems of man in his social surroundings, drawing from all of the social science fields and designed to give the student the background necessary for understanding and interpreting the major aspects of his social and cultural environment. Emphasis is placed on the inter-relations which exist between all aspects of man's culture and social institutions.

**Speech 51. SPEECH.** Four hours a week.

The introduction of the fundamentals of public speaking. Emphasis is placed on the practice of speaking and speech construction.

## **SPECIALIZED EDUCATION DIVISION**

### **SPECIAL BUSINESS SKILLS COURSES**

**Special Business 111. WORD STUDY AND SPELLING.** Two hours a week.

A course designed for the purpose of improving spelling ability and vocabulary. Extensive use of dictionary.

**Special Business 112. PERSONALITY DEVELOPMENT.** Three hours a week.

A course dealing with the importance of business etiquette, health, poise, good grooming, correct speech and manners, and the development of a right attitude toward work.

**Special Business 121. OFFICE TYPEWRITING I.** Five hours a week.

A course for beginners in typewriting. Covering the learning of the keyboard, knowledge of machine parts, centering, tabulation, and speed development.

**Special Business 122. OFFICE TYPEWRITING II.** Five hours a week.

A continuation of Office Typewriting I. It includes the typing of business letters, manuscripts, business forms, reports, minutes of meetings, and production and accuracy tests. Prerequisite: Special Business 121.

**Special Business 123. OFFICE TYPEWRITING III.** Five hours a week.

Continued speed building techniques, complex tabulation, rough draft, legal documents, application letters and data sheets, production techniques and problem typing. Prerequisite: Special Business 122.

**Special Business 133. BUSINESS ENGLISH.** Five hours a week.

This course is designed to meet the practical English needs of students in the business field. It includes a review of grammar, sentence structure, punctuation, paragraph construction, use of the dictionary, and letter writing.

**Special Business 141. COMMERCIAL MATHEMATICS.** Four hours a week.

A review of fundamental arithmetical processes and their business application.

**Special Business 143. PAYROLL ACCOUNTING AND PROCEDURES.** Four hours a week.

A study of the payroll laws and procedures. The acquisition of a basic knowledge of payroll records and reports essential in business operations. Prerequisite: Special Business 141.

**Special Business 144. ACCOUNTING I.** Four hours a week.

An introduction to the fundamental principles of accounting as applied to a sole proprietorship; debit and credit theory; accounts and trial balance; balance sheet and profit and loss statement; accounting for sales, purchases, and cash, the use of special journals; payroll procedures; sales tax; accounting records.

**Special Business 145. ACCOUNTING II.** Four hours a week.

A continuation of Special Business 144, except that this course applies to accounting for partnerships. Prerequisite: Special Business 144.

**Special Business 151. OFFICE MACHINES I.** Three hours a week.

Introduces the theory of the four basic operations of addition, subtraction, multiplication, and division on the comptometer, calculator, and adding-listing machines.

**Special Business 152. OFFICE MACHINES II.** Three hours a week.

Concentrates on the speed development in the use of the comptometer, calculator, and adding-listing machines. Emphasis is placed on the handling and figuring of business forms. Prerequisite: Special Business 151.

**Special Business 161. DUPLICATING MACHINES I.** Three hours a week.

Mimeograph and liquid duplication. Instruction in the cutting and correcting of stencils and masters, use of the mimeoscope, running of copies, operation and care of the machine, and the filing of stencils for future use. Prerequisite: Special Business 121.

**Special Business 162. DUPLICATING MACHINES II.** Three hours a week.

A continuation of Duplicating Machines I with extensive laboratory work requiring practice on matter for actual office use. Prerequisite: Special Business 161.

**Special Business 171. TRANSCRIBING MACHINES.** Three hours a week.

Emphasis is placed on the development of speed and accuracy in the transcribing of material from the voice transcription machines. Prerequisites: Special Business 111, 122, 133.

**Special Business 181. BUSINESS FILING I.** Three hours a week.

Filing rules in common use are studied in this course. Practice is given in alphabetic, geographic, numeric and subject filing systems.

**Special Business 182. BUSINESS FILING II.** Three hours a week.

Advanced training in filing with emphasis on speed in finding materials, preparing cross reference cards, and other procedures of filing. Prerequisite: Special Business 181.

**Special Business 191. PBX TRAINING.** Five hours a week.

The principles and practices in the use of office switchboard and proper telephone usage. Theory plus laboratory.

**Special Business 221. CLERICAL OFFICE PRACTICE.** Four hours a week.

In this course the student will be expected to do the various jobs found in a regular office. Prerequisite: Special Business 121.

**R. I. 100. READING IMPROVEMENT.** No credit. Five hours a week.

A course designed for students who wish to improve reading-study skills. How to study, how to take notes, and how to outline, receive attention. Exercises are given to increase speed of reading, to improve vocabulary, and to master word attack methods. Group instruction is given, but each person studies at his own level and receives individual attention as time allows.

Open to students from any division.

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