

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, thought; disorders of motility, 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)

RADIOLOGIC (X-RAY) TECHNOLOGY

Radiologic Technology 100. INTRODUCTION TO RADIOLOGIC TECHNOLOGY. One quarter hour.

A course designed to acquaint the student with the major areas of X-ray Technology, their relationship with the other paramedical professions, the professional and legal responsibilities of the radiation worker, and the need for and the basic means of radiation protection. (1+0)

Radiologic Technology 101. RADIOGRAPHY 1. Four quarter hours.

The subjects covered in this first quarter course include professional ethics, topographic anatomy, elementary patient positioning and darkroom chemistry and technique. (3+3)

Radiologic Technology 102. RADIOGRAPHY 2. Four quarter hours.

Nursing procedures pertinent to radiology and the more advanced positioning techniques using the radiographic phantom are correlated with study and experiments in the basic principles of exposure. Film critiques are held to evaluate the student's film. Prerequisite: Radiologic Technology 101. (3+3)

Radiologic Technology 103. RADIOGRAPHY 3. Five quarter hours.

Concentration is on the advanced aspects of patient positioning and film exposure techniques along with a thorough study of the unique problems of the radiography of infants and children. Prerequisite: Radiologic Technology 102. (4+3)

FOURTH QUARTER NOVICE HOSPITAL WORK EXPERIENCE. No credit.

A graduation requirement. Familiarization of the student with the rules, regulations and procedures of the hospital X-ray department in addition to lectures, supervised work experience and film critiques. (47+400 clock hours)

Radiologic Technology 201. RADIOGRAPHY 4. Four quarter hours.

A continuation of routine patient positioning and film critiques in addition to the study of special radiographic examinations. Prerequisite: Radiologic Technology 103. (3+3)

Radiologic Technology 202. RADIOGRAPHY 5. Five quarter hours.

Continuing patient positioning, exposure principles and practice and film critiques along with a supplemental study of X-ray circuits, tubes, and machines. Prerequisite: Radiologic Technology 201. (4+3)

Radiologic Technology 203. RADIOGRAPHY 6. Four quarter hours.

Radiographic examinations requiring contrast media are studied as well as medical terminology, office procedures, equipment maintenance and patient protection. Prerequisite: Radiologic Technology 202. (4+3)

EIGHTH THROUGH ELEVENTH QUARTERS HOSPITAL WORK EXPERIENCE. No credit.

A graduation requirement. The time is spent at the cooperating hospital X-ray department where practical experience in all types of X-ray examinations is accumulated as well as office and radiotherapy experience. (55+2080 clock hours)

SECRETARIAL TRAINING

Secretarial Training 101. SECRETARIAL ORIENTATION. One quarter hour.

This course is designed to help students understand the value of proper grooming and job attitudes in the business office. Some of the topics covered are voice, telephone techniques, personal appearance, job interviews, office relations, and social conduct as employed in the business office environment. This course is offered especially for women students enrolled in the several secretarial fields. (1+0)

Secretarial Training 120. ELEMENTARY TYPEWRITING A. Three quarter hours.

Designed for students with no previous typewriting instruction and may not be taken for credit by students who have had previous typewriting instruction in high school or college. An introduction to and mastery of the typewriting keyboard; short business and personal letters; and elementary forms of tabulation. Should be followed where applicable by Secretarial Training 122. (5+0)

Secretarial Training 121. ELEMENTARY TYPEWRITING. Three quarter hours.

Designed for students with a limited knowledge of typewriting as indicated by less than one year of high school typewriting or less than a C in high school typewriting. A brief review of the typewriter keyboard; simple business letters, and elementary tabulation. Students will not receive credit for Secretarial Training 121 if they have successfully completed Secretarial Training 120. Prerequisite: Familiarity with the typewriting keyboard. (4+0)

Secretarial Training 122. INTERMEDIATE TYPEWRITING. Three quarter hours.

Review of techniques of elementary typewriting; continuation of speed-building;

introduction to production typewriting; introduction to composition at the typewriter; introduction of business applications of the typewriter. Prerequisite: One year of high school typewriting or successful completion of Secretarial Training 120 or 121, or the equivalent. (5+0)

Secretarial Training 123. ADVANCED TYPEWRITING. Three quarter hours.

Continued speed-building techniques; advanced production typewriting techniques; skill in typewriting business letters; complex tabulation; rough draft; manuscript writing; legal documents; and business forms. Prerequisite: Two years of high school typewriting or Secretarial Training 122 or the equivalent. (5+0)

Secretarial Training 124. APPLIED TYPEWRITING. Two quarter hours.

Use of the electric typewriter in preparing materials for actual office use including various duplicating machines. Instruction is given in the operation of duplicators. Laboratory work is assigned for actual office use. Prerequisite: Secretarial Training 123, or the equivalent, and permission of the instructor. (2+1)

Secretarial Training 130. ELEMENTARY SHORTHAND. Four quarter hours.

This course is designed to develop skill in theory and related skills for the beginning shorthand student. Any student electing this class who has had prior shorthand training amounting to one quarter, one semester, or the equivalent may not enroll for credit. (5+0)

Secretarial Training 131. SHORTHAND THEORY AND INTRODUCTORY DICTATION. Four quarter hours.

This course is designed for intensive training in theory and development of dictation taking abilities to achieve skill in the range of 50-60 words per minute for three minutes. Prerequisite: Prior shorthand training of one quarter, one semester or the equivalent. (4+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. Prerequisite: Secretarial Training 131, or one year of high school shorthand, 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. Prerequisites: Secretarial Training 122 and 132, or two years of high school shorthand, or equivalent. (4+0)

Secretarial Training 221. BUSINESS WRITING. Four quarter hours.

The basic principles of business writing are developed. The writing of effective business letters is practiced, and extensive study is made of original letters that

have been used in business. Prerequisites: Communication Skills 101 and Secretarial Training 121, or equivalent. (4+0)

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

Further development of the ability to take new-matter dictation. 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, memorials, 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. Twenty hours of cooperative office training in the office at Ferris is required. Prerequisite: Secretarial Training 231. (4+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 twelve 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. A maximum of eight quarter hours of credit may be earned by students on a two-year curriculum. Twelve hours of credit are permitted only for students in four-year curricula. Prerequisites: Secretarial Training 124, 231, and 241.

Secretarial Training 262. COOPERATIVE OFFICE TRAINING SEMINAR. Four quarter hours.

Must be taken concurrently with Secretarial Training 261. Limited only to students in four-year curricula. Preparation of a specialized project in accordance with the student's particular interests and in cooperation with the employer and the Office Training coordinator. Prerequisite: Approval of the Dean, School of Commerce, and the departmental coordinator.

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 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)

SOCIAL SCIENCE

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

An introduction course in the social sciences which analyzes the problems

that arise in American society and within the groups that make up the society. The scientific method as it applies to the social sciences is considered. NOTE: A student should complete this course not later than the end of his sophomore year. The course is not open for credit to a student who has credit in Sociology 221, or 222, or 231, or the equivalents. (3+0)

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

A continuation of Social Science 101, including problems concerned with the satisfaction of human wants and the regulation of human behavior. NOTE: A student should complete this course not later than the end of his sophomore year. The course is not open for credit to a student who has completed Economics 221 or the equivalent. Prerequisite: Social Science 101 or consent of instructor. (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 222. SOCIAL PROBLEMS. Four quarter hours.

An analysis of representative social problems in contemporary America. Such societal problems as the following will be considered: delinquency, crime, alcoholism, drug addiction, prejudice, sex offenses, mental disease, immigration and others. Prerequisite: Sociology 221. (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 131. VOICE AND DICTION. Two 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. (2+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 151. ARGUMENTATION AND DEBATE. Four quarter hours.

A study of the techniques of investigation, reasoning, proof, and logical argument as preparation for debate. Each student conducts inquiry into the national intercollegiate debate proposition, prepares a brief, and enters into formal debate with his colleagues. Special attention is given to (1) analysis of the proposition, (2) research, (3) selection of issues, (4) kinds of argument, and (5) the structure of debate in American society. Prerequisite: Speech 121, or consent of instructor. (4+0)

Speech 152. 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. Prerequisite: Speech 151, or consent of instructor. (0+4)

Speech 220. PARLIAMENTARY PROCEDURE. Two quarter hours.

The methods of presiding over and participating in business meetings are studied and applied. Each student helps to frame a constitution and participates in regular business meetings. (2+0)

Speech 221. GROUP DISCUSSION PROCEDURES. Four quarter hours.

This course trains the student in the method of thinking and problem-solving used in committees, industrial and civic groups, and similar organizations. Each student participates in, leads, and evaluates group discussions on topics of current interest and importance. Prerequisite: Speech 121 or its equivalent. (4+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.

A study of the psychology and the techniques of persuasive speaking with special emphasis on the analysis of human behavior as it is expressed in audience reaction. Each student applies the techniques to the preparation and delivery of original persuasive speeches. Prerequisite: Speech 121, or its equivalent. (4+0)

Speech 233. PUBLIC SPEAKING. Four quarter hours.

An advanced speech course. Addresses for different occasions are considered; 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. (4+0)

SURVEYING AND TOPOGRAPHICAL DRAFTING

Surveying and Topographical Drafting 101. ORIENTATION TO CIVIL TECHNOLOGY. Three quarter hours.

This course emphasizes the role of the technicians in the fields of Civil Engineering and Land Surveying. The student is introduced to basic engineering principles, concepts of measurement, construction techniques, and related elementary problems emphasizing the use of the slide rule. (2+2)

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

The use and basic properties of most construction materials are studied in this course. Some of the materials covered are concrete, bituminous concrete, steel, wood, non-ferrous metals, and plastics. The student is introduced to basic laboratory procedures in materials testing. (2+3)

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 physical geology. The study of the processes of Vulcanism, Diastrophism, and Graduation. Classification and identification of common rocks and minerals are studied in the laboratory. (2+3)

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

Proper survey procedures are introduced. Instruction is given in the problems of surveying and in the operation of surveying equipment and instruments; measuring lines, angles, and differences in elevation, methods of compiling field notes, plus traverse and profile leveling. Prerequisites: Completion or concurrent enrollment in Mathematics 124. (2+8)

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

A continuation of Surveying 1. This is an engineering-surveying course including horizontal, vertical and easement curves, instrument adjustments, the problems of coordinates, and the distribution of errors. Prerequisites: S.T.D. 201, and Mathematics 122. (2+8)

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

A topographical surveying course including mapping control, plan table surveys, instrument maintenance and repair, celestial observations, and triangulation, with specialized problems used in coordination with Topographical Drafting 2. Prerequisite: S.T.D. 202. (2+8)

Surveying and Topographical Drafting 204. SURVEYING CALCULATIONS. Three quarter hours.

An introduction to the theory of probability, triangulation and astronomy. Computations involved in celestial observations. Prerequisites: Surveying and Topographical Drafting 201 and Mathematics 122. (3+0)

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

This is primarily a laboratory course involving the plotting and computations of profiles, cross-sections, traverses, contours, and deed descriptions. The course emphasizes drafting with ink and includes related problems from U.S.G.S. maps. Prerequisites: S.T.D. 202 and Engineering Graphics 122. (1+6)

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

A continuation of Topographical Drafting & Mapping 1. Commutation and

drawing of special problems found in Engineering & Land Surveying. A topographical map is compiled from data obtained in Surveying 3. Mechanical lettering and plotting devices are used extensively. Prerequisites: S.T.D. 205 and concurrent enrollment in S.T.D. 203, or by special permission. (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, characteristics, and engineering classifications of soils. Prerequisites: Physics 211 or S.T.D. 102. (2+3)

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

This course covers the basic elements of construction. Some of the topics included are construction scheduling, equipment, and methods. The students perform calculations in analysis of construction operations to determine such factors as costs, production, and economics of equipment use. Prerequisites: S.T.D. 207, Physics 211 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. Prerequisite: Physics 211 or permission of instructor. (3+0)

Surveying and Topographical Drafting 210. ELEMENTS OF HIGHWAY DESIGN. Three quarter hours.

Fundamental theories and standard practices involved in highway construction as well as in concrete and bituminous 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, intersections, and grade separations. Flat surface design, parking installations and curbing are also included. Prerequisite: S.T.S. 202. (2+3)

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

A student is introduced to the documents relating to advertisements, bid proposals, contracts, and specification to engineering work. In addition, topics related to professional ethics in general, in which surveying registration, mechanics lien, and workmen's compensation are included. Prerequisite: S.T.D. 208 or Highway Technology 204. (2+0)

TECHNICAL ILLUSTRATION

Technical Illustration 101. ORIENTATION TO TECHNICAL ILLUSTRATION. Two quarter hours.

An introduction to the technical illustration field. The technical illustrators' tools, skills, responsibilities, standard of workmanship, and functions. Uses of technical illustrations and opportunities for the technical illustrator. Study of and practice in lettering. (1+3)

Technical Illustration 102. TECHNICAL ILLUSTRATION 2. Seven quarter hours.

Freehand Gothic Lettering and mechanical lettering devices. Charts and graphs. Orthographic and axonometric projections. Introduction to grids. (4+11)

Technical Illustration 103. TECHNICAL ILLUSTRATION 3. Eight quarter hours.

Enlarging and reducing drawings. Use of ellipse templates, proportional dividers, and other mechanical aids. Interpretation of blueprints from various industries. Shading with applied materials. (3+17)

Technical Illustration 201. TECHNICAL ILLUSTRATION 4. Eight quarter hours.

Individual assignment of practical projects. Special treatments, including phantom, cutaway, and exploded assemblies. Shading with applied materials. Keyline and paste-up. Emphasis on industrial standards. (3+17)

Technical Illustration 202. TECHNICAL ILLUSTRATION 5. Six quarter hours.

Group assignments for manual production. Emphasis on team work. (2+13)

Technical Illustration 203. TECHNICAL ILLUSTRATION 6. Eight quarter hours.

Seminar and critique sessions. Development of student portfolio of Technical Illustrations. Keyline and paste-up. Industrial displays, posters and safety cartoons. (3+17)

Technical Illustration 261. INDUSTRIAL MATERIALS AND PROCESSES 1. Three quarter hours.

Introduction to and study of basic industrial materials and processes. Designed to develop an understanding of industrial tools, and materials; and an appreciation of engineering functions, product design, and production methods. (3+0)

Technical Illustration 262. INDUSTRIAL MATERIALS AND PROCESSES 2. Three quarter hours.

Continuation of Technical Illustration 261. (3+0)

Technical Illustration 263. DESIGN, MATERIALS AND REPRODUCTION. Three quarter hours.

Information on and study of layouts and make-up of industrial manuals, instruction sheets and other materials encountered by the technical illustrator. Keylining, color separation, and techniques used in industrial publication. Layout, paste-up, overlays, reverses, scaling, and screens. Study of reproduction processes. (2+2)

TRADE TECHNICAL

(Teacher Education Majors Only)

A-400. SPECIAL PROBLEMS IN AUTOMOTIVE SERVICE. One to ten quarter hours of credit.

Permission of the instructor and director is required. The student will pursue a course of instruction and study based upon his needs for acquiring beginning or

advanced knowledge and practical skill in automotive service. The activity will consist of laboratory and/or lecture, research, reference study, and writing requirements in conformance with the particular course objectives.

A-420. SPECIAL PROBLEMS IN RELATED TECHNOLOGY. One to five quarter hours of credit.

Permission of the instructor and director is required. The student will pursue a course of instruction based upon his needs for related technical information in the automotive service area. The activity will consist of lecture, class discussion, research, report writing, and reference study in accordance with the objectives of the particular course.

D-400. SPECIAL PROBLEMS IN HEAVY EQUIPMENT AND DIESEL REPAIR. One to ten quarter hours of credit.

Permission of the instructor and director is required. The student will pursue a course of instruction and study based upon his needs for acquiring beginning or advanced knowledge and practical skill in heavy equipment and diesel repair. The activity will consist of laboratory and lecture, research, reference study, and writing requirements in conformance with the particular course objectives.

D-420. SPECIAL PROBLEMS IN RELATED TECHNOLOGY. One to five quarter hours of credit.

Permission of the instructor and director is required. The student will pursue a course of instruction based upon his needs for related technical information in the heavy equipment and diesel repair area. The activity will consist of lecture, class discussion, research, report writing, and reference study in accordance with the objectives of the particular course.

MT-400. SPECIAL PROBLEMS IN MACHINE TOOL. One to ten quarter hours of credit.

Permission of the instructor and director is required. The student will pursue a course of instruction and study based upon his needs for acquiring beginning or advanced knowledge and practical skill in machine tool. The activity will consist of laboratory and/or lecture, research, reference study, and writing requirements in conformance with the particular course objectives.

MT-420. SPECIAL PROBLEMS IN RELATED TECHNOLOGY. One to five quarter hours of credit.

Permission of the instructor and director is required. The student will pursue a course of instruction based upon his needs for related technical information in a machine tool area. The activity will consist of lecture, class discussion, research, report writing, and reference study in accordance with the objectives of the particular course.

MD-400. SPECIAL PROBLEMS IN TECHNICAL DRAFTING. One to ten quarter hours of credit.

Permission of the instructor and director is required. The student will pursue a course of instruction and study based upon his needs for acquiring beginning or advanced knowledge and practical skill in technical drafting. The activity will consist of laboratory and/or lecture, research, reference study, and writing requirements in conformance with the particular course objectives.

MD-420. SPECIAL PROBLEMS IN RELATED TECHNOLOGY. One to five quarter hours of credit.

Permission of the instructor and director is required. The student will pursue a course of instruction based upon his needs for related technical information in the technical drafting area. The activity will consist of lecture, class discussion, research, report writing, and reference study in accordance with the objectives of the particular course.

P-400. SPECIAL PROBLEMS IN PRINTING. One to ten quarter hours of credit.

Permission of the instructor and director is required. The student will pursue a course of instruction and study based upon his needs for acquiring beginning or advanced knowledge and practical skill in an area of printing. The activity will consist of laboratory and/or lecture, research, reference study, and writing requirements in conformance with the particular course objectives.

P-420. SPECIAL PROBLEMS IN RELATED TECHNOLOGY. One to five quarter hours of credit.

Permission of the instructor and director is required. The student will pursue a course of instruction based upon his needs for related technical information in printing. The activity will consist of lecture, class discussion, research, report writing, and reference study in accordance with the objectives of the particular course.

ES-400. SPECIAL PROBLEMS IN RADIO-TELEVISION. One to ten quarter hours of credit.

Permission of the instructor and director is required. The student will pursue a course of instruction and study based upon his needs for acquiring beginning or advanced knowledge and practical skill in radio-television. The activity will consist of laboratory and/or lecture, research, reference study, and writing requirements in conformance with the particular course objectives.

ES-420. SPECIAL PROBLEMS IN RELATED TECHNOLOGY. One to five quarter hours of credit.

Permission of the instructor and director is required. The student will pursue a course of instruction based upon his needs for related technical information in the radio-television area. The activity will consist of lecture, class discussion, research, report writing, and reference study in accordance with the objectives of the particular course.

DESCRIPTION OF CLOCK-HOUR CREDIT COURSES

ARCHITECTURAL DRAFTING

AD-131. BASIC ARCHITECTURAL PROJECTIONS. Seventeen hours a week.

A course designed to give the beginning student a foundation in the graphic presentation of objects. Content includes linework, lettering, orthographic projections, isometric and oblique drawings, and an introduction to the drafting techniques and practices of architectural work. Three hours of lecture and fourteen hours of drafting room practice per week. (3+14)

AD-132. ADVANCED ARCHITECTURAL PROJECTIONS. Seventeen hours a week.

A continuation of AD-131, with emphasis on the use of perspective projections and shades and shadows. Three hours lecture and fourteen hours of drafting room practice per week. (3+14)

AD-133. PRELIMINARY DRAWINGS. Seventeen hours a week.

Application of the previous two quarters work to specific building problems and the presentation of their solution in an architectural idiom. Presentation methods and rendering.

AD-144. DESIGN FUNDAMENTALS. Three hours a week.

This course includes a study of the theory of design, space composition, color harmony and materials and textures.

AD-171. MATERIALS OF CONSTRUCTION I. Three hours a week.

A survey of the basic materials and methods used in the construction industry, with emphasis on the properties and uses of structural materials.

AD-172. MATERIALS OF CONSTRUCTION II. Three hours a week.

A continuation of AD-171, with emphasis on the study of interior and exterior finish materials.

AD-201. MECHANICAL EQUIPMENT FOR BUILDINGS. Three hours a week.

A survey of the heating, ventilating, plumbing, sanitation, and electrical equipment required in buildings.

AD-202. STRUCTURAL DESIGN. Three hours a week.

An introduction to the design of structural members in steel, reinforced concrete and wood. Prerequisite: AD-211.

AD-203. ARCHITECTURAL OFFICE PRACTICE. Two hours a week.

A study of architectural office procedure and organization, construction methods, cost analysis and estimation.

AD-211. MECHANICS AND STRENGTH OF MATERIALS. Three hours a week.

A study of the fundamentals of equilibrium, strength of materials and analysis of structural frames and members.

AD-231. RESIDENTIAL DRAFTING. Twenty hours a week.

An introduction to residential construction and requirements. Development of preliminary plans and working drawings for typical builder and custom homes. Included is a study of the F.H.A. minimum property requirements.

AD-232. WORKING DRAWINGS I. 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-233. WORKING DRAWINGS II. 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.

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.

AD-258. SPECIFICATIONS. Two hours a week.

A study of the organization and preparation of legal documents and architectural specifications required in building construction.

AUTO BODY, 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.** Twenty-five 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-101. GASOLINE ENGINES.** Ten hours a week.

This course is designed to acquaint the student with the design, operation, troubleshooting and service procedures of the modern gasoline engines. Along with student participation in the disassembly and reassembly of engine units, adequate service and technical engine data are presented to prepare the student for practical experience in engine servicing.

A-102. DRIVELINE I. Ten hours a week.

A lecture-laboratory course including lecture, demonstration, and student participation in disassembly and reassembly of components for understanding the function, construction, operation, servicing, and troubleshooting techniques of the conventional driveline units, such as clutch assemblies, standard transmissions, propeller shafts and joints, final drives and differentials, and types of rear suspensions. The student is prepared for practical experience on passenger cars and light trucks.

A-103. ELECTRICAL AND FUEL SYSTEMS I. Ten hours a week.

Function, construction, operation, troubleshooting, and servicing of the components of the charging system, cranking system, ignition system, and fuel system are studied. Students are expected to participate in the disassembly and reassembly of components, and perform the required bench tests.

A-104. SUSPENSIONS AND BRAKES I. Ten hours a week.

This is an introductory course in automotive suspensions and brakes. Technical instruction, using the media of lecture, lecture demonstration and laboratory practice, will cover nomenclature, theory of operation, and service procedures on passenger car and light truck suspension systems, brake systems, wheels and tires, steering gears and related parts.

A-150. SERVICE AREA. Thirty-five hours a week.

This service area program is designed to provide the student with field-type service work in a controlled instructional setting. The student is given the opportunity to make practical application of the technical material presented to him in previous courses. Special emphasis is placed on the vehicle service needs which are most frequently requested in modern commercial service centers. Prerequisites: A-101, A-102, A-103, A-104.

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

The Basic Electricity course is designed as a prerequisite for the Automotive Department's electrical courses. The course content is based on electrical fundamentals and practical applications. Instructional units include electricity and magnetism, storage batteries, ignition systems, charging system, starting systems and instrumentation.

A-200. SERVICE AREA. Thirty-five hours a week.

This course is a continuation of A-150. Students are expected to make practical application of all the technical material and methods learned in all of their previous courses in this customer service program. Students are also expected to develop work standards in quality, and quantity of work produced, to be employable as a service mechanic or technician. Prerequisites: A-150, A-202, A-203, A-204, A-213, W-183, R-181.

A-202. DRIVELINE II. Ten hours a week.

A lecture-laboratory course in automatic transmissions including lecture, demonstration, and student participation in disassembly and reassembly of selected transmissions for purposes of understanding the function, construction, operation, servicing, and troubleshooting procedures. The student is prepared for the servicing

and diagnosis of popular type automatic transmissions on scheduled passenger cars. Prerequisite: A-102.

A-203. ELECTRICAL AND FUEL SYSTEMS II. Ten hours a week.

This course includes instruction on Modern A.C. and D.C. generators and control units, carburetion, and transistor controlled systems. The function, construction, operation, troubleshooting procedures are studied and servicing requirements are stressed. Students will participate in the disassembly and re-assembly of components, and will perform the required bench tests. Prerequisite: A-103.

A-204. SUSPENSIONS AND BRAKES II. Ten hours a week.

This is an advanced course in automotive suspensions and brakes. Basic suspension and brake service problems will be reviewed and followed by instruction on power brake systems, power steering systems, and suspension correction procedures for light frame damage. Prerequisite: A-104.

A-213. ELECTRICAL CIRCUITS. Ten hours a week.

Through lecture, demonstration, and laboratory experience the horn circuit, windshield wiper circuit, instrument circuit, lighting circuit, and electric power accessory circuits are studied. Time also is devoted to the understanding and use of vehicle wiring diagrams. The students have an opportunity to participate in disassembly and reassembly of components and the bench testing needed to determine servicability.

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

The automotive service management course is designed to offer the students a practical orientation to the management functions of modern Dealerships or Service Centers. Accent is placed on those subjects that directly or indirectly influence the efficiency of the service department.

HEAVY EQUIPMENT AND DIESEL REPAIR

D-101. DIESEL ENGINES. Ten hours a week.

This course is designed to acquaint the student with troubleshooting and service procedures of 2- and 4-stroke cycle diesel engines. Special emphasis is placed on general terminology, combustion chamber design, engine governors, turbochargers, blowers and filters, and testing of the engine for performance characteristics.

D-103. ELECTRICAL AND FUEL SYSTEM I. Ten hours a week.

This is an introductory course in electrical and fuel system service for trucks and heavy equipment. Function, construction, operation, troubleshooting and servicing to the charging system, cranking system, ignition and fuel system are stressed. This course provides students with experience in disassembly, testing, and assembly of components with an accent on serviceability of these components.

D-104. SUSPENSIONS AND BRAKES I. Ten hours a week.

This is an introductory course in suspensions and brakes for the Heavy

Equipment and Diesel Repair mechanic. Technical instruction, using the media of lecture, lecture demonstration, and laboratory practice, covers nomenclature, theory of operation, and service procedures on passenger car and heavy equipment suspension systems, brake systems, wheels and tires, standard steering gears and related parts.

D-195. DIESEL FUEL INJECTION I. Ten hours a week.

This course is a lecture and laboratory combination and includes study of diesel fuels, primary and secondary fuel distribution, and injection. Instruction is provided on common rail systems, unit injectors, and primary pump systems as used on trucks and heavy equipment applications.

D-112. FINAL DRIVES. Ten hours a week.

A course including lecture, demonstration, and student participation in disassembly and reassembly of selected final drive components. Instruction covers clutches, transmissions, rear axles, steering, brakes, and torque converters as used on trucks, tractors, and crawlers.

D-205. DIESEL FUEL INJECTION II. Ten hours a week.

This lecture-laboratory course is a continuation of D-105 with accent on secondary pumps, high pressure distribution systems and injectors, fuel injection pumps and governors. Service procedures and practices are incorporated in the laboratory. Prerequisite: D-105.

D-272. SERVICE MANAGEMENT. Four hours a week.

The Heavy Equipment Service Management course is designed to offer the students a practical orientation to the management functions of the Heavy Equipment and trucking service centers. Accent is placed on the following topics: preventive maintenance records, equipment control records, inventory control, vehicle operational costs, part procurement procedures and shop supervision. A study is also made of the rules and regulations pertaining to and as it applies to this industry as prescribed by the Interstate Commerce Commission and the Michigan Public Service Commission.

D-150. SERVICE AREA. Thirty hours a week.

This service area program is designed to provide the student with field-type service work in a controlled instructional setting. The student is given the opportunity to make practical application of the technical material presented to him in previous courses. Repair of field equipment is stressed with special emphasis on gasoline engine service and electrical and fuel system service. Prerequisites: D-103, D-104, D-105, and D-112 or D-101.

D-200. SERVICE AREA. Thirty hours a week.

This course is a continuation of D-150. Repair of field equipment is continued; however, the emphasis is shifted to diesel engine repair and diesel engine tune-up. There is also an accent on final drive and clutch service and repair as it applies to heavy equipment. Prerequisite: D-150.

D-250. SERVICE AREA. Thirty hours a week.

This course is designed to serve as the last service quarter of instruction for the student. All technical course work from previous quarters is utilized in the

preventive maintenance portion of the program. Students are expected to complete normal repair and service requests in a professional manner. During this term accent is not only on quality of repair, but also on the quantity of work completed. Prerequisite: D-200.

GRAPHIC REPRODUCTION TECHNOLOGY

GR-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.

GR-153. VISUAL AIDS PREPARATION AND USE. Three 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.

GR-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.

GR-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.

GR-171. SURVEY OF GRAPHIC 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.

GR-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 use of intermediates.

GR-181. MECHANICAL DRAWING TECHNIQUES. Five hours a week.

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

GR-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.

GR-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.

GR-262. PROCESS CAMERA WORK AND PLATEMAKING. 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.

GR-264. 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.

GR-265. OFFSET REPRODUCTION AND PLATEMAKING. Twenty 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 quipment.

GR-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.

GR-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.

GR-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 blue-print and allied reproduction plant operations.

GR-271. PHOTOGRAPHIC THEORY – CAMERAS AND PLATE MAKING.
Three hours a week.

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

GR-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.

MACHINE TOOL

MT-141. MACHINE TOOL THEORY I. Five hours per week.

An introduction to layout, hand, power, and basic machine tools. Cutting tools, speeds, and transmission of power and motion.

MT-142. MACHINE TOOL THEORY II. Five hours per week.

A continuation of Machine Tool Theory I with advanced techniques in the use of lathe and drilling machines stressed. Safety in shop practices and the use and care of precision measuring tools are emphasized.

MT-143. MACHINE TOOL THEORY III. Five hours per week.

Fundamentals of screw thread and standard taper systems, their production and use, are studied in detail. The characteristics and measurement of machined surfaces are presented.

MT-151. MACHINE TOOL LAB. I. Fifteen hours per week.

Practice in basic benchwork, sawing, filing, layout, drilling, and reaming. Care and use of standard basic machine and measuring tools.

MT-152. MACHINE TOOL LAB II. Fifteen hours per week.

A continuation of bench and basic machine work. Shaper and milling machine. Work holding methods and set-ups. Cutting tools and precision measuring tools.

MT-153. MACHINE TOOL LAB III. Fifteen hours per week.

Advance work in tool room machine area. Surface and cylindrical grinding introduced.

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 AND HEAT TREAT PRACTICE.
Five hours a week.

A course which covers the application of metallurgical fundamentals as to the machinability of common metals, the changes that occur in metals during machining operations, and the behavior of cutting tool metals. This course will include practice in operating temperature controlled hardening equipment and testing equipment.

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-241. MACHINE TOOL THEORY IV. Five hours per week.

The construction, use, and machine principles of shapers, planers, and milling machines. Milling machine cutter design, and functions are emphasized. A study of the principles of coolants and lubricants.

MT-242. MACHINE TOOL THEORY V. Five hours per week.

The study of metal cutting principles as applied to machine tool operations. The advanced study of machine tool processes, operations and set-ups.

MT-243. MACHINE TOOL THEORY VI. Five hours per week.

A further investigation and study of metal cutting and machine tool principles, including differential indexing, helical and cam milling, and gear cutting. Tracer template design and metric transposition are included.

MT-251. MACHINE TOOL LAB IV. Fifteen hours per week.

Continuation of grinding and advanced milling practices. Assembly practices and methods.

MT-252. MACHINE TOOL LAB V. Fifteen hours per week.

Advanced training centered on machine areas, special projects, trade skills, machine tool maintenance, toolmaking.

MT-253. MACHINE TOOL LAB VI. Fifteen hours per week.

Advanced training planned to individual need. A continuation of practices and standards developed in previous courses. Craftsmanship and accuracy stressed.

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. This course may be taken upon arrangement with the instructor and permission of the dean.

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 adviser, and is subject to the approval of the dean.

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.

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, 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 or 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 characteristics, 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. Fifteen 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 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 volt-meter, 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. There is home service call practice.

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, maxtrix 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 the capillary tube systems; thermostats 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, including 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-161. APPLIED ELECTRICITY. Four hours a week.

A lecture course on the fundamentals of electricity with application to the area of refrigeration, heating and air conditioning. This course will include the study of the electron theory, magnetism, DC and AC current, electrical producers, meters, motors, transformers, capacitors and relays. (4+0)

AC-163. TRANSPORTATION, REFRIGERATION AND AIR CONDITIONING. Four hours a week.

Four hours a week of classroom lecture and demonstrations, plus laboratory applications, covering a study of transport compressor construction, drive mechanisms, capacity control and other problems identified with mobile refrigeration, such as various types of safety devices, condensing problems, and equipment locations. Various types of eutectic plates and eutectic solutions for short haul and hold-over service are discussed. Problems concerning comfort air conditioning, as they apply to trucks, bus, aircraft and marine applications are presented. (2+2)

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

Five hours of classroom lecture; fifteen hours of demonstrations, calculations and problems coordinated 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.

AC-272. AIR MOVEMENT AND VENTILATION. Four hours a week.

Four hours of classroom lecture and problems covering the areas of air handling for heating, air conditioning and ventilation. Situations concerning air duct design, psychrometric problems, and problems of design and installation of industrial ventilation will be covered. (4+0)

AC-273. ELECTRICAL CIRCUITRY AND CONTROLS. Four hours a week.

This is a four hour lecture-demonstration course 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, dampers and valves used on heating and air conditioning equipment. (4+0)

TECHNICAL DRAFTING AND TOOL DESIGN**TD-100. DRAFTING TECHNIQUES. Five hours a week.**

This is a lecture-laboratory course composed of one hour of theory and four hours of practice a week. Basic techniques of lettering, linework, and geometric construction are explored through discussion and laboratory assignments. A study of pictorial drawings and blue-print reading completes the preparation for technical drafting.

TD-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.

TD-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.

TD-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.

TD-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.

TD-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.

TD-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.

TD-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.

TD-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.

TD-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 Technical Drafting student with an understanding of the field of welding as related to his field of study.

TD-282. MECHANICS AND STRENGTH OF MATERIALS I. Two hours a week.

The following topics are covered: Forces, components, resultants, and equilibrants—parallelograms 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 equivalents.

TD-283. MECHANICS AND STRENGTH OF MATERIALS II. Two hours a week.

A continuation of TD-282. The following topics are covered: Centroids, moments of inertia and section modulus of sections—transfer formula—shearing stress and diagrams, bending moments and diagrams in beams—moving loads bending stress, the flexure formula—combination tension or compression and bending stress. Prerequisite: TD-282.

TD-300. TECHNICAL DRAFTING I. Twenty-five hours a week.

This is a lecture-laboratory course composed of five hours of drafting theory and twenty hours of drafting practice. It is designed to promote the basic technical skills involved in general technical drafting. Product drafting procedures are used in teaching projection practices, dimensioning techniques, surface finish controls, geometric and positional tolerances, sections, symbols and conventions. Laboratory assignments cover detail, sub-assembly, and assembly drawings. A.S.A. Standards are stressed throughout the course. Prerequisite: TD-100.

TD-400. TECHNICAL DRAFTING II. Twenty-five hours a week.

This is a lecture-laboratory course composed of five hours of drafting theory and twenty hours of drafting practice. Emphasis is placed on the solution of layout problems and the study of spatial relationships of lines, planes, and solids. Elements of descriptive geometry and principles of rotation are presented through discussion and assignments of typical industrial applications. Prerequisite TD-300.

TD-500. TOOL DESIGN I. (Jigs and Fixtures) Twenty-five hours a week.

This is a lecture-laboratory course composed of five hours of design theory and twenty hours of design practice. A thorough study of production tooling devices for tool guiding and work holding is complemented by laboratory assignments of jig and fixture design problems. Current industrial designs as well as vendors' catalogs, provide references and guidance for practical individual design solutions. Prerequisite: TD-400.

TD-600. TOOL DESIGN II (Dies). Twenty-five hours a week.

This is a lecture-laboratory course composed of five hours of design theory and twenty hours of design practice. The design of production press-work dies include typical cutting, forming, and draw dies. Complex variations include cam operated, combination, and draw dies. Press accessories are studied as they apply to design problems. Prerequisite: TD-500.

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-191. BASIC METALLURGY. Three hours a week.

A lecture course covering steel classifications, heat treatment procedures and properties of ferrous and non-ferrous metals and non-destructive testing. This course is offered to Technical Drafting, Welding and Machine Tool students.

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. WELDING METALLURGY. Three hours a week.

This is a lecture-demonstration course designed to give welding students a better understanding of effects of alloying elements on the weld, grain structure changes made by welding, slags and gasses for weld shielding, and etching, inspection and testing of welds. This course utilizes the Metallurgy Laboratory.

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.

RELATED EDUCATION

Communication Skills 51. COMMUNICATIONS I. Three hours a week.

A course designed to achieve desirable standards of effectiveness in oral and written communications. 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.

Communication Skills 61. TECHNICAL REPORT WRITING. Three hours a week.

A study of the preparation of industrial technical reports. Emphasis is placed on good writing principles and use of supplementary illustrations as they apply to technical reports. Practice reports are required on topics in the student's major area of interest.

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, construction, axioms, proofs, rectilinear figures, the circle measurement and elementary space relations. Prerequisite: G-102 or equivalent.

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

Functions, logarithms, solution of triangles, and graph functions. Prerequisite: Satisfactory completion of G-103 or equivalent.

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 need 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 such 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.

A course for beginners in typewriting. The keyboard is mastered through manual exercises and drills. Business letter forms and simple tabulation problems are introduced.

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

Continuation of G-126 with increased emphasis on typing techniques. The various forms of business letters, manuscripts, rough drafts, and other reports are included along with accuracy and production tests.

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.

A course designed to teach the fundamentals necessary for the successful operation of a self-owned business. Its contents cover ten major areas which are important in this type of ownership. Major areas include the problems of small business operation, basic business law, business forms and records, financial problems, location problems, ordering and inventory, layout, improving your business, and employer-employee relations.

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 are 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 in the major aspects of national, state, and local governments. The three levels are integrated in a functional study of government, with special reference to Michigan.

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

An analytical study of selected problems of man in his social surroundings, drawn 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.

Students receive instruction and practice on research, outlining, speech organization, platform behavior, and delivery. A study of the rules and practices of Parliamentary Procedure designed for the promotion of orderly and effective meetings.

SPECIAL BUSINESS SKILLS

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

A course designed for the purpose of improving spelling ability, vocabulary, word syllabication, and dictionary usage.

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

This course is designed to orient the student to the business world by developing a right attitude toward work and to assist him to understand himself as well as

his employer. The course deals with the importance of business etiquette, health, poise, good grooming, correct speech and manners, and human relations.

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 spelling. Extensive work is done in the various areas of business letter writing, business reports, and annotation of business articles. A term paper or project is required in this course. Prerequisite: Typewriting.

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

A review of fundamental arithmetical processes and their business applications. Problems solved in this course involve fractions, decimals, percentages, payroll, depreciation, interest, discounts, ratios, and the analysis of business papers.

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.

This course is a continuation of Special Business 144, except that it applies to an introduction to the fundamental principles of accounting as applied to a partnership. A partnership practice set is completed in this course. 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 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 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. 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 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. 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 221. CLERICAL OFFICE PRACTICE. Five hours a week.

This course is designed to have the student apply the acquired knowledge and skills to the practical problems that arise in the secretary's work. Four hours a week are spent in a classroom situation and one hour a week is spent in PBX training and/or a cooperative work experience assignment.

Special Business 300. APPLIED CLERICAL OFFICE PROCEDURES. Two to five hours a week.

A work experience program designed to give the student practical experience in applying clerical office procedures in a selected administrative or faculty office. To qualify for admission to this course, a student must (1) have a cumulative honor point average of 2.5 or more; (2) have the permission of the instructor; and (3) have the approval of the divisional dean.

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 work 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.

DESCRIPTION OF CARNEGIE UNIT-CREDIT COURSES

HIGH SCHOOL DEPARTMENT

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

A course in the fundamentals of grammar, punctuation and composition for the student who has had little or no high school English.

English III

Fundamentals are continued with more attention to sentence structure and organization. Writing problems center on library research and term paper technique.

English IV

In sequence, this represents the second part of English III. In content, emphasis is placed on writing. Grammar, sentence structure and punctuation are reviewed as necessary.

English V – American Literature

This is an historical survey of American writers from John Smith to William Saroyan and Kay Boyle.

English VI – American Literature

American life and literary style are considered through the writing of such representatives as Franklin, Twain, Whitman and Benet.

English VII – English Literature

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 – English Literature

A study of English literature and the influences that acted upon it ranging from the 18th century impact of science writers Thomas Huxley and Charles Darwin to the present poetry of Dylan Thomas.

Speech I

Students receive instruction and practice on research, outlining, speech organization, platform behavior, and delivery. A study of the rules and practices of Parliamentary Procedure designed for the promotion of orderly and effective meetings.

Speech II

This course involves both discussion and debating procedures. The students are required to deliberate and debate current problems of serious import.

U.S. Government

The basic course for all citizens. It presents the relationships of the federal form of government—national, state, county and local.

Economics

This provides the vocabulary and basic economic theories. Many reference materials in such areas as production, strikes, investment and the stock market are used.

Geography

The principles of social geography. The influences of the position of the continents and their environments on the lives and cultures of man are studied.

Problems of Democracy

The social sciences of history, government, economics, and psychology are integrated in a study of selected social problems.

Sociology

The student is introduced to a study of the relationship of man to society and the evolution of group life and culture. The influences of environment as they relate to urban or rural living are considered. The study of such institutions as marriage, the family, and education trace these influences.

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

This course includes an analysis of the typical animal cell, protoplasm, scientific method, logical reasoning, and life processes: skeletal, nervous, circulatory, endocrine, respiratory, digestive and reproductive systems of man. Brief comparative studies of man and lower animals are made. (3+4)

Biology II

The principles of heredity and units on major diseases affecting man are analyzed. Simple and higher forms of plant life are compared. Lower and higher invertebrate animal forms and higher vertebrate forms of animals are studied. Adaptations of organisms and the theory of organic evolution are discussed. Elementary animal dissection is introduced in the laboratory periods. (3+4)

Chemistry I

Introduction to chemistry, oxygen, hydrogen and water; structure of matter; the alkali metal family; chlorine; acids, bases, and salts; and ionization. Prerequisite: One year of High School Algebra. (3+4)

Chemistry II

Sulphur and its compounds; nitrogen and its compounds; chemical reactions; carbon chemistry; the halogens; periodic table; nuclear energy. Prerequisite: Chemistry I or equivalent. (3+4)

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

A review of fundamental arithmetical processes and their business applications. Problems solved in this course involve fractions, decimals, percentages, payroll, depreciation, interest, discounts, ratios, and the analysis of business papers.

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

Study of constructions involving angles and polygons, and theorems and exer-

cises illustrating the properties of angles and polygons. Prerequisite: Algebra II or equivalent.

Plane Geometry II

Study of the properties of circles; areas of polygons; and similar figures, ratios, and proportions. Prerequisite: Plane Geometry I or equivalent.

Solid Geometry

Study of the properties of three dimensional figures; and methods of calculating dimensions, areas, and volumes. Prerequisite: Plane Geometry II or equivalent.

Trigonometry

Study of properties of the trigonometric ratios, including graphing of trigonometric functions, and their use in calculations involving triangles. Prerequisite: Plane Geometry II or equivalent.

Advertising

A basic course covering newspaper, magazine, outdoor, direct mail, radio, television, and specialty advertising. The scope and purposes of advertising are considered with particular emphasis on the writing of copy and slogans, layout, packaging and labeling, testing of advertisements, and the study of advertising agencies, campaigns, and laws.

Bookkeeping I

An introduction to bookkeeping principles and their meaning when applied to a sole proprietorship. It is expected that upon completion of the course, the student will have a thorough understanding of such terms as debits, credits, assets, liabilities, proprietorship, profit and loss, journals, ledgers, trial balances, financial statements and other terms common to the subject.

Bookkeeping II

A continuation of the principles learned in Bookkeeping I with special emphasis on more advanced forms of financial statements with application to bookkeeping for a partnership. Accrued items, deferred charges, and reserves for depreciation are studied in detail.

Business English

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 spelling. Extensive work is done in the various areas of business letter writing, business reports, and annotation of business articles. A term paper or project is required in this course.

Commercial Law

An introduction to the fundamental principles of contracts, negotiable instruments, agency, real estate, personal property, and wills.

Office Management

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

*Sh be listed with
College of Arts & Sciences
W. Ed. I. 8/30/67*

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

The principles of Gregg Shorthand Simplified with emphasis on the mastery of brief forms, the reading and writing of shorthand, and the taking of new-matter and familiar material. At the termination of this course, a student should meet a minimum speed requirement of 50 words per minute on new-matter material for three minute periods.

Shorthand II

This course is a continuation of Shorthand I with continued emphasis on developing speed and accuracy in the reading and writing of shorthand. Further emphasis is placed on the development of writing new outlines in accordance with Gregg theory, and the introduction to transcription techniques and practices. At the termination of the course, a student should meet a minimum speed requirement of 60 words per minute on new-matter material for five minute periods. Prerequisite: Shorthand I or its equivalent.

Shorthand III

This course encompasses the development of the ability to write new-matter dictation, the improvement of transcription techniques, and the increased emphasis of developing speed and accuracy in transcription on the typewriter of new-matter dictation. At the termination of the course, a student should meet a minimum speed requirement of 70 words per minute on new-matter material for five minute periods with a minimum transcription rate of 20 words per minute. Prerequisites: Shorthand II and Typing II or their equivalents.

Typewriting I

A course for beginners in typewriting. The keyboard is mastered through manual exercises and drills. Business letter forms and simple tabulation problems are introduced. It is expected that the student will attain a minimum speed of 25 words a minute upon completion of the course.

Typewriting II

Continuation of Typewriting I with increased emphasis on typing techniques. The various forms of business letters, manuscripts, rough drafts, and other reports are included along with accuracy and production tests.

Typewriting III

Production techniques and project typing are emphasized with increased accuracy and speed expected as a result of the additional experience.

INDEX

	Page
A.W.S.	114
Absence from Class	121
Academic Calendar	6, 7
Academic Credit for Activity Courses	118
Academic Deans and Directors	12
Academic Information, General	121-124
Academic Programs	127-230
Academic Standards	121
Accounting Advisory Committee	43
Accounting, Courses in	233-236
Accounting, Higher, Curricula	147-148
Accounting, Curricula	129-131
Accreditation and Approval	67, 68
Activities, Student	113-118
Activity Card, Student	113
Administration and Faculty	9
Admission to Ferris	75
Admission, Registration, and Orientation	75-80
Admission Requirements by Schools	75, 76
Admission with Advanced Standing	128
Adult Education Program, Community	170, 171
Advertising Major, Curricula	139-141
Advisory Committees	43-58
Air Conditioning, Refrigeration and Heating Courses in	336-338
Air Conditioning, Refrigeration and Heating Curricula	221, 222
Alumni Building	69
Apartment Facilities	71
Architectural Drafting Advisory Committee	43, 44
Architectural Drafting, Courses in	321, 322
Architectural Drafting, Curricula	210, 211
Art, Courses in	236, 237
Associate in Applied Science Degree	177
Associate in Arts Degree	159, 160
Athletic Facilities	70
Athletics, Intercollegiate	116, 117
Athletics, Intramural	117
Auditing Courses, Reviewing or	84
Auto Body and Fender Repair and Painting, Courses in	322, 323
Auto Body and Fender Repair and Painting, Curricula	211, 212
Auto Machine Shop, Courses in	323
Auto Machine Shop, Curricula	212, 213
Automotive Service, Courses in	323-325
Automotive Service, Curricula	213
Awards	104-108
Band	118

	Page
Basic Business Curricula	144, 145
Beauty Culture (Cosmetology)	181-182
Biology, Courses in	237-241
Board of Control	11
Bond Hall	71
Bookstore	69
Brophy Hall	71
Buildings, Description of	68-71
Building Construction Technology, Courses in	241-243
Building Construction Technology, Curricula	178-179
Business Administration Advisory Committee	44, 45
Business Administration, Curricula	131-134
Business Data Processing Advisory Committee	45, 46
Business Data Processing, Curricula	148, 149
Business Data Processing, Courses in	243-245
Business Education, Curricula	228
Business Skills, Special	154-157
Calendar	2, 6, 7
Calendar, Academic	6, 7
Campus, Description and Location of	67
Carlisle Hall	70
Central Administrative Aides	15, 16
Chemistry, Courses in	245-247
Chemistry, Industrial, Courses in	279, 280
Chemistry, Pharmaceutical, Courses in	298, 299
Chorus	118
Clark Hall	70
Clerical, General Curricula	154, 155
College Officers and Deans	12
College-Wide Faculty Committees and Councils	41-43
College-Wide Officers	13
Collegiate Technical Division, Admission Requirements	76, 176-179
Commencement	124
Commerce, Courses in	247-251
Commerce, School of, Admission Requirements	75, 127-157
Commerce, School of, Degree Curricula	128, 129
Commerce, School of, Programs in	129
Commerce, Terminal Curricula	143-149
Commercial Art, Courses in	251, 252
Commercial Art Technology Advisory Committee	46, 47
Commercial Art Technology, Curricula	179-181
Commercial Banking Advisory Committee	48
Commercial Banking Courses in	252-254
Commercial Banking, Curricula	134-136
Commercial Banking, Two-year, Curricula	149, 150
Committees, Advisory	43-58
Committees, Faculty	41, 42

	Page
Community Adult Education Program	170, 171
Continuing Orientation Courses	122
Convocations, General Education	123
Cooperating Staff	40, 41
Cosmetology, Courses in	254, 255
Cosmetology, Curricula	181-182
Cosmetology, Instructor's Curricula	182
Counseling Center	90, 91
Counseling Services	90
Counseling, Summer Program	79
Court and Conference Reporting Advisory Committee	47
Court and Conference Reporting, Courses in	255-257
Court and Conference Reporting, Curricula	153, 154
Credit Designation	121
Credits, Transfer of	128
Deans and Directors, Academic	12
Debating	117
Degree Curricula in Commerce	127-157
Degrees	128, 144, 159, 177, 226
Dental Assistant Advisory Committee	48, 49
Dental Assistant, Courses in	257, 258
Dental Assistant, Curricula	182, 183
Dental Hygiene, Courses in	258-260
Dental Hygiene, Curricula	184, 185
Dental Laboratory Technology, Courses in	261, 262
Dental Laboratory Technology Curricula	185-187
Department of Education	225-230
Deposit Procedures	77, 78
Deposit Refund Policy	86
Description of Campus	67
Description of Courses	233-352
Diesel Repair and Heavy Equipment, Courses in	325-327
Diesel Repair and Heavy Equipment, Curricula	214
Drafting, Courses in	321, 322, 338-340
Drafting, Curricula	205-207, 210, 211, 223
Dramatics	117
Driver Education	264
East Building	69
Economics, Courses in	262, 263
Education, Courses in	263-266
Education of Veterans	67, 68, 123, 124
Educational Grants and Scholarships	95-104
Electrical Power Technology, Courses in	266-268
Electrical Power Technology, Curriculum	187, 188
Emeriti	16, 17
Environmental Sanitarian Assistant, Courses in	270-272
Environmental Sanitarian Assistant, Curricula	188-190
Environmental Sanitation Advisory Committee	49

	Page
Employment, Part-Time	104
Engineering Graphics, Courses in	268, 269
English, Courses in	269, 270
Enroll, How to	78
Enroll, When to	79
Enrollment Definitions	80
Enrollment, Late	79
Enrollment, Size of	67
Environmental Health, Courses in	270-272
Environmental, Health, Curricula	190, 191
Evening School (Community Adult Education Programs)	170, 171
Executive Officers	12
Executive Secretarial, Curricula	150, 151
Faculty	17-40
Fees and Expenses	83-86
Fees for Auditing Courses	84
Fees, Other General	83
Financial Aids for Students	91, 108
Food Service Facilities	90
Food Service Supervision Advisory Committee	49, 50
Food Service Supervision, Courses in	272-274
Food Service Supervision, Curricula	191, 192
Foreign Languages, Courses in	274
Forensics	117
Fraternalities	114
French, Courses in	274
General Academic Information	121-124
General Clerical, Curricula	154, 155
General Education and Pre-Professional Division, Admission Requirements	76, 157
General Education and Pre-Professional Division, Programs in	161-168
General Education, Convocations	123
General Education, School of	157-167
General Education, School of, Admission Requirements	76, 158-159
General Information	67-71
General Studies, Curricula	161, 162
Geography, Courses in	274, 275
Geology, Courses in	275
Grading System	122
Graduation Requirements	124, 128, 129, 144 159, 160, 169, 173
Graphic Reproduction Advisory Committee	51, 52
Graphic Reproduction Technology, Curricula	214, 215
Graphic Reproduction Technology, Courses in	327-329
Hallisy Hall	70
Health and Physical Education	70
Health and Physical Education Requirements	122-123

	Page
Health Center	71
Health Education, Courses in	275, 276
Health and Physical Education Building	70
Health Service, Student	15, 108, 109
Heavy Equipment and Diesel Repair, Courses in	325-327
Heavy Equipment and Diesel Repair, Curricula	214
Helen Gillespie Ferris Hall	70
Henderson Hall	71
High School Department, Courses in	348-352
High School Department, Programs in	168, 169
Higher Accounting, Curricula	147, 148
Highway Technology, Courses in	276
Highway Technology, Curricula	193, 194
History, Courses in	277
History of Ferris State College	61
Home Life-Career, Courses in	278
Home Life-Career, Curriculum	194, 195
Honor Societies	114
Hospital Pharmacy Advisory Committee	52
Housing	71
Humanities, Courses in	278, 279
Industrial Chemistry Technology, Courses in	279, 280
Industrial Chemistry Technology, Curricula	195-197
Industrial Electronics Technology, Courses in	280-282
Industrial Electronics Technology, Curricula	197, 198
Industrial Production Technology, Courses in	282, 283
Industrial Production Technology, Curriculum	198, 199
Instructional Buildings	69, 70
Instructionally Related Organizations	115
Intercollegiate Athletics	116, 117
Interest Clubs	115
Interfraternity Council	114
Intramural Sports	117
Johnson Hall	70
Journalism	117, 118
Journalism, Courses in	283, 284
Late Enrollment	80
Law, Courses in	284, 285
Library	68
Library Technician Advisory Committee	52
Library Technician, Courses in	285, 286
Library Technician, Curricula	200, 201
Library Staff	14, 15
Literature, Courses in	286, 287
Loan Funds, Student	92-95
Location of Ferris State College	67

	Page
Machine Tool, Courses in	329-331
Machine Tool, Curricula	216, 217
Management Major, Transfers	136, 137
Marketing Advisory Committee	53
Marketing and Retailing, Curricula	151, 152
Marketing Courses in	287-291
Marketing Major, Curricula	137-139
Marketing System	122
Marking System	122
Married Students Housing	90
Masselink Commons	70
Mathematics, Courses in	291-294
Mathematics, Teacher Education, Curricula	227
Maximum Load	121
McNerney Hall	71
Medical Assistant Advisory Committee	53, 54
Medical Assistant, Courses in	294, 295
Medical Assistant, Curricula	201, 202
Merrill Hall	70
Michigan Residence Defined	84, 85
Miller Hall	71
Music	118
Music Activities Center	70
Music Courses in	295, 296
Office Machines, Curricula	156
Opportunity School, Ferris as an	61
Optical Technology Advisory Committee	54
Optical Technology (Ophthalmic), Courses in	296-298
Optical Technology (Ophthalmic), Curriculum	202-204
Organizations, Student	113-118
Orientation, Admission and Registration	75-80
Orientation, Courses in	298
Orientation Course, the Continuing	122
Orientation Days Program, the	80
Panhellenic Council	114
Part-time Jobs for Students	108
Payment of Tuition and Fees	84
Payroll Clerk, Curricula	156
Pharmaceutical Chemistry, Courses in	298, 299
Pharmacists, Requirements for Registration	172
Pharmacognosy, Courses in	301, 302
Pharmacology, Courses in	302
Pharmacy Administration, Courses in	301
Pharmacy, Courses in	299-301
Pharmacy, Curricula	173-175
Pharmacy, School of, Scholastic Requirements	172
Pharmacy, School of, Programs in	171-175

	Page
Pharmacy, School of, Standards	172
Philosophy of Ferris State College	61, 62
Physical Education, Courses in	302-305
Physical Science, Courses in	305
Physics, Courses in	305, 306
Pickel Hall	71
Placement Services	91
Political Science, Courses in	306
Pre-Dental, Curricula	165, 166
Pre-Engineering, Curricula	162, 163
Pre-Law, Curricula	164, 165
Pre-Medical, Curricula	165, 166
Pre-Medical Technology, Curricula	165, 166
Pre-Professional and General Education Division, Programs in	161-168
Pre-Teaching, Elementary Curriculum	167, 168
Pre-Teaching, Secondary Curriculum	166, 167
President	12
Printing Advisory Committee	55
Printing, Courses in	331-333
Printing, General Curricula	217, 218
Printing Management and Supervision, Curricula	218, 219
Professional Fraternities	115
Professional Service Personnel	13, 14
Psychology, Courses in	306-308
Public Accounting, Additional Requirements for	129
Publications, Student	116
Purposes of Ferris State College	62, 63
Puterbaugh Hall	71
Radio-Television Service, Courses in	333-335
Radio-Television Service, Curricula	219, 220
Radiologic (X-Ray) Technology, Courses in	308, 309
Radiologic (X-Ray) Technology, Curricula	204, 205
R.E.A. Job Safety, Advisory Committee	55, 56
Reading Improvement, Courses in	344, 347, 352
Receptionist, Curricula	155
Recognition Societies	115
Refrigeration, Heating and Air Conditioning, Courses in	336-338
Refrigeration, Heating and Air Conditioning, Curricula	221, 222
Refund Policy	85
Registration, Orientation and Admission	75-80
Related Education, Courses in	342-345
Related Education, Department of	170
Religious Organization for Students	116
Residence Defined, Michigan	84, 85
Residence Facilities	71
Residence Halls and Food Service Management Personnel	15
Residence Halls Councils	114
Residence Halls Counseling	91

	Page
Residence Requirements for Degree Courses	122
Retailing and Small Business Management, Curricula	146, 147
Reviewing or Auditing Courses	84
Schedule of Charges	83
Scholarships	95-104
Science Hall	69
Science Teacher	229
Science Teacher Education, Curricula	229
Secretarial Advisory Committee	56
Secretarial Executive, Curricula	150, 151
Secretarial, Curricula	141-143
Secretarial Training, Courses in	309-312
Seminars, Clinics and Workshops, Description of	171
Service Organizations	115
Size of Enrollment and Source of Students	67
Social Science, Courses in	312, 313
Sociology, Courses in	313
Sororities	114
Special Business Skills, Courses in	345-347
Special Business Skills, Programs in	154-157
Specialized Education Division, Admission Requirements	76
Specialized Education Division, Programs in	168-171
Speech, Courses in	314, 315
Sports, Intramural	117
Starr Educational Center	69
Stenographic and Clerical Practice, Curricula	145, 146
Student Activities and Organizations	113-118
Student Activity Card	113
Student Automobiles	68
Student Center	71
Student Center Board	113
Student Conduct	68
Student Employment	108
Student Government	113
Student Health Center	71
Student Health Service	15, 108, 109
Student Housing	71
Student Loan Funds	92
Student Publications	116
Student Services	89
Summer Counseling Program	80
Surveying and Topographical Drafting Advisory Committee	56
Surveying and Topographical Drafting Technology, Courses in	315-317
Surveying and Topographical Drafting Technology, Curricula	205-207
Swan Technical Arts Center	70
Taggart Hall	71
Teacher Education Advisory Committee	57

	Page
Teacher Education Certification Requirements	226
Teacher Education, Curricula	228-230
Teacher Education Department, Programs in	225-230
Teacher Education Department, Student Teaching Requirements	226
Teacher Education Program, Admission Requirements	225, 226
Technical and Applied Arts, School of	176-224
Technical Drafting and Tool Design	223, 224
Technical Drafting and Tool Design, Courses in	338-340
Technical Illustration, Advisory Committee	57, 58
Technical Illustration, Courses in	317, 318
Technical Illustration, Curricula	207, 208
Television, Color Advanced Option, Curricula	220
Television-Radio Servicing, Courses in	333-335
Television-Radio Servicing, Curricula	219-220
Terminal Business Curricula	143-149
Trade and Industrial Center	70
Trade and Industrial Division, Admission Requirements	208-210
Trade and Industrial Division, Courses in	321-342
Trade and Industrial Division, Programs in	210-224
Trade Technical, Courses in	318-320
Trade Technical Teaching, Curricula in	230
Trade Technical Teacher Education Advisory Committee	58
Transcripts	122
Transmitter Service, Courses in	335, 336
Transmitter Service, Curricula	220, 221
Travis Hall	70
Tuition and Fees	83, 86
Tuition and Fees, Payment of	84
Tutorial and Remedial Services Department	170
Typist, Curricula	156
Vandercook Hall	70
Veterans, Education of	123, 124
Ward Hall	71
Welding, Courses in	341, 342
Welding, Curricula	224
West Building	69