

Accounting 221. INTERMEDIATE ACCOUNTING 1. Four quarter hours.

A more detailed study of the principles in the beginning accounting courses. Current inventory methods, depreciation, depletion, investments and intangibles are among the items developed. Pronouncements of the American Institute of Accountants are emphasized. Prerequisite: Accounting 123.

Accounting 222. INTERMEDIATE ACCOUNTING 2. Four quarter hours.

A further study of the liability and net worth section of the balance sheet, especially of corporations. Bonds, amortization, capital stock, surplus, etc. Practice is also provided in the analysis of financial statements. Prerequisite: Accounting 221.

Accounting 231. GOVERNMENT ACCOUNTING. Four quarter hours.

The basic principles underlying governmental and institutional accounting, the operation of funds, the budget process, tax accounting for cities, and preparation of significant reports. Prerequisite: Accounting 222.

Accounting 251. PROBLEMS IN TAXATION. Two quarter hours.

Federal taxes such as gift taxes, estate, social security, capital stock and excess profits, etc.; and State taxes as inheritance, sales, corporation, use tax, etc.

Accounting 321. COST ACCOUNTING 1. Four quarter hours.

A study of the specialized techniques and procedures used in industry to determine the cost of goods manufactured. Emphasis is on the control of costs and the job order cost system. Prerequisite: Accounting 123.

Accounting 322. COST ACCOUNTING 2. Four quarter hours.

Process cost accounting is studied, followed by a study of standard costs. The current use of standards is given special attention. References are made to publications of the National Association of Cost Accountants. Prerequisite: Accounting 321.

Accounting 331. PRODUCTION CONTROL. Four quarter hours.

Production control in relation to general management and the consideration of costs and competitive positions as affected by size, organization, location, processes, equipment, product design, research, psychological aspects of management problems, etc. Prerequisite: Accounting 322.

Accounting 421. FEDERAL TAXATION 1. Four quarter hours.

Theory and practice of income tax accounting; a comprehensive study of the Federal income tax law as applied to individuals.

Accounting 422. FEDERAL TAXATION 2. Four quarter hours.

Theory and practice of income tax accounting; a comprehensive study of the Federal income tax law as applied to partnerships, fiduciaries, and corporations. Prerequisite: Accounting 421.

Accounting 423. AUDITING. Four quarter hours.

Auditing in detail, the viewpoint of the professional accountant, the viewpoint of the business enterprise; kinds of audits, working procedures, reports, ethics, analysis of proportions, etc. Prerequisite: Accounting 222.

Accounting 451. ADVANCED ACCOUNTING. Four quarter hours.

Advanced accounting problems of various types such as are used or have been used on C. P. A. examinations. Prerequisite: Accounting 222.

Commerce 121. BUSINESS MATHEMATICS. Four quarter hours.

A review of fundamental principles of arithmetic, percentage, profit and loss, interest, and problems of interest to the student of business and to accountants.

Commerce 122. BUSINESS ORGANIZATION. Four quarter hours.

An introduction to the study of business enterprises, the proprietorship, the partnership and the corporation, this course surveys the full range of problems confronting owners and managers, and the proper methods of solving those problems; of financing, management, merchandising or production controls, employment, insurance, taxation.

Commerce 131. MATHEMATICS OF FINANCE. Four quarter hours.

These major mathematical finance topics are carefully covered: simple and compound interest, annuities, sinking funds, depreciation, value of bonds and introduction to life annuities and insurance. Prerequisite: Math. 121. Open to juniors and seniors only.

Commerce 221. RETAIL SELLING AND STORE MANAGEMENT. Four quarter hours.

Retailing is a vocational subject with the emphasis on service to the customer rendered through knowledge of modern store planning, organization, ethics of selling, advertising, why customers buy, finding customer's needs, answering objections and closing sales.

Commerce 231. INDUSTRIAL AND COMMERCIAL GEOGRAPHY. Four quarter hours.

A study of world-wide economic and geographic conditions. A survey of the basic resources and industries of the world as they have been changed by an age of industrial and mechanical power. Initial attention is given to minerals and the fundamentals of manufacturing. The great industries and economic activities, the important developments in mechanical progress, agriculture, and the use of raw materials are all discussed in their geographical setting with emphasis on the industrial and commercial geography of the United States.

Commerce 241. OFFICE MANAGEMENT. Four quarter hours.

Scope and duties of the Office Manager. Building up the office force, personnel control, use of office space, psychological factors, office standardization, furniture and equipment, supplies and forms, communication, record systems, cost control and planning.

Commerce 321. MARKETING. Four quarter hours.

A survey course covering the general functions of marketing methods of merchandising, manufactured products and farm products, price policies, competitive practices, price control. Problems discussed.

Commerce 322. MARKETING PROBLEMS AND POLICIES. Four quarter hours.

A practical study of the manner in which marketing is carried on by manufacturers. It presents a complete examination of the major marketing areas in which a manufacturer must establish policies. A study is made of pricing, advertising, selling, and warehousing policies. Consideration is also given to the business and marketing organization needed to accomplish the marketing function. Prerequisite: Commerce 321.

Commerce 331. SALESMANSHIP. Four quarter hours.

The development of the salesman, his preparation, approach, personality. A study of the art of personal contact through practice talks in which the principles of arousing interest, creating desire, and obtaining action are clinched.

Commerce 332. ADVERTISING. Four quarter hours.

Purpose to be attained: Forms of advertising, as newspaper, magazine, outdoor, direct mail, specialty, etc.: writing of copy, layout, campaigns, appropriations, etc.

Commerce 333. ADVERTISING CAMPAIGNS. Four quarter hours.

The specialized subject of local newspaper advertising is developed. It deals primarily with the non-metropolitan daily and weekly newspaper. In its treatment of advertising, selling, research, planning, layout, and copy writing, the course describes the best and newest techniques, those that have been tried and proved by progressive newspaper advertising departments.

Commerce 341. CREDITS AND COLLECTIONS. Four quarter hours.

This course is a division of marketing. It is a study of the giving of credit, sources of credit information, the use of the information, the causes of business failure, and the organization of a credit department. The latter part of the course is devoted to the subject of collections, including a thorough study of the problems of the collector, psychology of collection, the rights of creditors, the procedure in collections, and a brief study of mail order installment collections. Prerequisites: Accounting 122 and Law 221.

Commerce 421. BUSINESS STATISTICS. Four quarter hours.

An introductory course emphasizing the practical value and use to the business man of statistical methods. Presentation is made of the methods of collecting, tabulating, and analyzing both internal and external business data. Among the items considered in detail are graphic presentation, averages, measures of dispersion, correlation and index numbers.

Commerce 422. CORPORATION FINANCE. Four quarter hours.

A study of the legal forms, financial structure and methods of financing business organizations, especially the corporation. Details of the study include: investment banking, the marketing of securities, methods of short-term financing, the nature of large corporations and combinations, reorganizations and the termination of businesses.

Commerce 451. INVESTMENT PRINCIPLES. Four quarter hours.

Forms of investments, real estate, stocks, bonds. Risks, and their effect on returns. Safety, government, municipal, industrial, public utility, and other forms of bonds. Common stock, preferred stock, etc.

Commerce 461. PRINCIPLES OF INSURANCE. Four quarter hours.

An introductory course in insurance designed to acquaint the student with the economic and social service rendered both to individuals and to businesses by insurance. The approach is primarily that of the purchaser of insurance in order to develop an understanding of insurance contracts and practices dealing with fire, life, casualty, marine, fidelity, social, accident, and health insurance.

Law 221. ELEMENTARY COMMERCIAL LAW. Four quarter hours.

A survey course for those who have had no law training and wish to secure a knowledge of the fundamental principles of contracts, negotiable instruments, sale of goods, agency, partnership, real estate, and personal property. For secretarial students and others not specializing in accounting and business administration.

Law 222. AGENCY, PARTNERSHIP, NEGOTIABLE PAPER, SALES.
Four quarter hours.

The purpose is to acquaint the student with the legal principles underlying the relation that exists when one person acts for another as agent and when two or more persons are engaged in business as co-partners. Negotiable instruments are defined, the essentials presented, and the operation of the law studied with reference to cases. The second section of the course deals with the study of the laws affecting the sale of personal property.

Law 223. REAL AND PERSONAL PROPERTY; CORPORATION LAW.
Four quarter hours.

The purpose of the course is to acquaint the student with the legal aspects of the corporation and its conduct with special emphasis on the Michigan Statutes and Decisions. The second section of the course deals with the Federal Bankruptcy Act and its effects upon the business man. This course also treats of the definition of property, classification of property and the methods by which estates in property may be created. A study is made of the principles of descent and distribution, the making of wills, and those practical points relating to property that should be known to every business man.

NOTE: All commerce students are required to take non-credit courses in Penmanship and Spelling.

EDUCATION AND PSYCHOLOGY

Psychology 221. INTRODUCTORY PSYCHOLOGY. Four quarter hours.

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

Psychology 222. ADVANCED GENERAL PSYCHOLOGY. Four quarter hours.

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

Psychology 223. EDUCATIONAL PSYCHOLOGY. Four quarter hours.

An application of the principles of psychology to the practical work of the teacher. Outside readings, written exercises, and a workbook required.

Psychology 251. PERSONALITY IMPROVEMENT. Four quarter hours.

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

Psychology 252. PSYCHOLOGY OF BUSINESS. Four quarter hours.

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

Psychology 321. PHYSIOLOGICAL PSYCHOLOGY. Four quarter hours.

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

Psychology 421. PSYCHOLOGY OF ADOLESCENCE. Four quarter hours.

Comprehensive study of the problems which affect and beset young people in the years 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.

Psychology 422. ABNORMAL PSYCHOLOGY. Four quarter hours.

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

Education 221. INTRODUCTION TO EDUCATION. One quarter hour.

A review and analysis of the profession of teaching as a career field. Qualifications, legal status, working conditions, salaries and benefits, professional organizations, in-school and out-school responsibilities, and similar topics are considered.

Education 321. HISTORY OF MODERN EDUCATION. Four quarter hours.

The history of education from the Renaissance to the present day. Emphasis is placed on the educational movements and reformers of the eighteenth and nineteenth centuries and their effects on American education.

Education 322. PRINCIPLES OF SECONDARY EDUCATION. Four quarter hours.

The philosophy and psychology of procedures in secondary schools.

Education 411. COUNSELING AND GUIDANCE. Two quarter hours.

An introductory course in the theory and practice of counseling and guidance procedures. Relationships between the counseling and classroom instructional practices are stressed. Covers methods of gathering data on student background and behavior, interpretation of data, drawing implications for instructional methodology, interviewing, testing, and referral practices. Prerequisite: Education 221 and Psychology 223.

Education 412. SCHOOL AND COMMUNITY RELATIONS. Two quarter hours.

An overview of interrelationships of school and community agencies and their contributions to the educational development of modern American youth. Includes study of home, family, church, civic, and legal agencies insofar as they bear on school and educational services. Prerequisite: Education 221.

Education 421. METHODS OF TEACHING SCIENCES. Four quarter hours.

Methods of teaching sciences in high school.

Education 431. METHODS OF TEACHING COMMERCIAL SUBJECTS.

Four quarter hours.

A study of methods of teaching commercial courses in the high school. Major consideration is given to the teaching of bookkeeping, junior business training, shorthand, typewriting, economic geography, business law, and consumer economics.

Education 441. EDUCATIONAL TESTS AND MEASUREMENTS. Four quarter hours.

A critical study of the best-known standardized tests of aptitude and achievement. The various types of informal objective tests are constructed by the class. Elementary study of methods of collection, treatment, and interpretation of statistical data involved in classroom testing. Prerequisite: Psychology 221 and 223.

Education 451, 452 and 453. DIRECTED TEACHING IN THE HIGH SCHOOL. Five to fifteen quarter hours.

Observation and participation in classroom instruction in the Big Rapids High School. Prerequisite: a methods course. Students who expect to enroll should arrange in advance with the Commerce Office.

ENGLISH, LITERATURE, COMMUNICATION SKILLS**English 121. COLLEGE GRAMMAR.** Four quarter hours.

An advanced course in English grammar, comprising a detailed study of inflection, syntax and the analysis of the sentence. Current trends are stressed.

English 122. FRESHMAN COMPOSITION. Four quarter hours.

Required of all freshmen. Essays dealing with basic human problems are used as points of departure for the student's own writing. Vocabulary building, reading comprehension, and clear thinking are stressed as essential aids to effective communication. Students are encouraged to discuss their individual writing problems in conferences with the instructor. Weekly papers or the equivalent, required. Prerequisite: English 121.

English 123. FRESHMAN COMPOSITION. Four quarter hours.

A continuation of English 122 sustaining the same emphasis upon the handling of factual material, the development of sound value-judgments, and the careful analysis of thought-processes as requisites of good writing.

English 221. EXPOSITION. Four quarter hours.

An advanced course in expository writing. A study is made of the principles of writing as applied to special forms, such as reports, special feature articles, book reviews, and familiar essays. Prerequisites: English 122 and 123.

English 222. THE SHORT STORY. Four quarter hours.

The development of the short story is studied. The student reads and studies a large number of modern short types, and receives practice in gathering material, plotting, and writing short stories. Prerequisite: English 122.

Journalism 221. NEWS WRITING. Four quarter hours.

An introduction to journalism with exercises in newspaper writing, editing, and assembling.

Journalism 222. NEWS EDITING. Four quarter hours.

Laboratory course in connection with the "Ferris Torch". Copyreading, rewriting, headline writing, and page make-up. Prerequisite: Journalism 221 or equivalent.

Journalism 223. APPLIED JOURNALISM. Two quarter hours.

A laboratory course conducted in the college newspaper office and the print shop four hours a week, under direction of faculty adviser and printing instructor. Two hours of credit may be earned each quarter, but not more than a total of six hours may be counted.

Literature 221. ENGLISH LITERATURE 1. Four quarter hours.

A general survey of the field of English literature. Lectures and quizzes on principal writers, historical periods, and literary movements. Extensive reading and interpretation of poetry and prose selections.

Literature 222. ENGLISH LITERATURE 2. Four quarter hours.

Literature 222 may be elected without Literature 221 as a course in nineteenth-century English literature. In both courses the relation of English literature to Continental literature is stressed. The development of various literary forms is traced.

Literature 223. CONTEMPORARY LITERATURE. Four quarter hours.

A survey of American, English, and Continental literature of the twentieth century.

Literature 321. AMERICAN LITERATURE 1. Four quarter hours.

A general survey of American literature between 1607 and 1870. The chief writers of this period and their writings are assigned and discussed with an aim to develop some appreciation of the growth of American thought as revealed in the literature of the period.

Literature 322. AMERICAN LITERATURE 2. Four quarter hours.

Continuation of Literature 321 from 1870 to the present. 322 may be elected without 321 as a course in Modern American Literature.

Literature 323. SHAKESPEARE. Four quarter hours.

This course is devoted to a study of Shakespeare's craftsmanship. His tragedies and comedies will be analyzed as to characterization, dialogue, plot. Reading and producing of selected scenes.

Literature 421. CONTEMPORARY DRAMATISTS. Four quarter hours.

Lectures and discussions about outstanding playwrights of our time, mostly English and American (J. M. Barrie, Millington, Synge, Bernard

Shaw, Somerset Maugham, Eugene O'Neill, Maxwell Anderson, Thornton Wilder) and a few principal continental dramatists (Chekhov, Andre Gide, Giraudoux, Gerhard Hauptmann, Molnar). Reading and producing of selected scenes.

Literature 422. PLAYWRITING. Four quarter hours.

Technique of Playwriting: Plot, dialogue, structure, characters. Reading and analyzing of scenes by outstanding dramatists. Students will be encouraged to write short plays. Evaluation of their products. Contests.

C. S. 101. COMMUNICATION SKILLS 1. Three quarter hours.

An approach to the harmonious development of the basic communications skills, integrated around central problems of the student's adjustment to his environment. Exercises in reading and writing, speaking and listening are purposefully related to the student's major or technical area of study. These are designed to aid the student in developing those attitudes and aptitudes which will enable him to derive the fullest benefits from his educational experiences, and in formulating as clearly as possible his own educational objectives.

C. S. 102. COMMUNICATION SKILLS 2. Three quarter hours.

A continuation of C. S. 101 sustaining the same emphasis upon the handling of factual material. Essays dealing with basic human problems are used as points of departure for the student's own writing and speaking. Vocabulary building, reading comprehension, and clear thinking are stressed as essential aids to effective communication. Prerequisite: C. S. 101.

C. S. 103. COMMUNICATION SKILLS 3. Three quarter hours.

A continuation of C. S. 102 involving the approach to communications skills through basic human problems as they appear in an increasing variety of literary types. Emphasis is placed upon the development of sound value-judgments and the careful analysis of thought-processes. Prerequisite: C. S. 102.

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. 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.

Speech 122. DISCUSSION AND DEBATE. Four quarter hours.

A study of principles and methods of group discussion and debate in their various forms. Practice will be given in applying these principles to a consideration of questions of current interest and importance.

Speech 123. INTERCOLLEGIATE DEBATE. Two quarter hours.

Application of principles of argumentation and debate in contest situa-

tions. The questions used for intercollegiate debate will be studied intensively. The course may be repeated to a total of no more than eight quarter hours of credit.

Speech 221. GROUP DISCUSSION PROCEDURES. Two quarter hours.

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

Speech 222. ACTING. Four quarter hours.

Learning to interpret roles through voice, gestures, and bodily action blended into characterization. Special problems of the actor are considered. Includes study of the various types of drama and their differing demands in characterization.

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

Emphasis is placed on the various units of play production—play selection, casting, direction, stage design, scenery construction, make-up, costuming, business management, and advertising. This course is designed especially for those who may be called on to direct plays in high schools and community theaters. Members of this class will be given opportunity to direct one-act plays and to assist in directing full-length plays.

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.

Speech 232. PERSUASIVE SPEAKING. Four quarter hours.

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

Speech 233. PUBLIC SPEAKING. Two quarter hours.

An advanced speech course. Addresses for different occasions are considered, with emphasis placed on adjusting the approach to the specific audience. Careful attention is given to effective organization and delivery. Prerequisite: Speech 121 or its equivalent.

FOREIGN LANGUAGES

French

French 121. BEGINNING FRENCH I. Four quarter hours.

Pronunciation. Essentials of grammar in close connection with oral drill. Conversation on everyday topics. Composition.

French 122. BEGINNING FRENCH 2. Four quarter hours.

Continuation of French 121. Completion of basic grammar. Practice in conversation of wider scope. Composition.

French 123. INTERMEDIATE FRENCH 1. Four quarter hours.

Reading of French short stories. Oral and written practice with special stress on idiomatic expression.

French 221. INTERMEDIATE FRENCH 2. Four quarter hours.

Continuation of French 123. Reading of a French play in rehearsal style. Teaching language more and more French. Composition increasingly without English model.

French 222. ADVANCED FRENCH 1. Four quarter hours.

Reading of French newspapers and other periodicals. Discussions in French. Practice in composition on assigned topics.

French 223. ADVANCED FRENCH 2. Four quarter hours.

Reading of selections from outstanding works of fiction and science with discussion entirely in French. Written reports on outside reading.

German

German 121. BEGINNING GERMAN 1. Four quarter hours.

Pronunciation drill, essentials in grammar, simple idioms, constant oral practice. Elementary composition.

German 122. BEGINNING GERMAN 2. Four quarter hours.

Continuation of German 121. Completion of basic grammar, extended practice in reading, speaking and writing German.

German 123. INTERMEDIATE GERMAN 1. Four quarter hours.

Reading of German short stories. Oral practice with stress on idiomatic expression. Composition increasingly independent of English model.

German 221. INTERMEDIATE GERMAN 2. Four quarter hours.

Reading of a German play in rehearsal style with reports and discussion. Teaching language increasingly German.

Spanish

Spanish 121. BEGINNING SPANISH 1. Four quarter hours.

Pronunciation. Essentials of grammar. Simple conversation and composition.

Spanish 122. BEGINNING SPANISH 2. Four quarter hours.

Continuation of Spanish 121. Completion of basic grammar. Conversation of wider scope. Stress on reading fluency and correct pronunciation. Composition.

Spanish 123. INTERMEDIATE SPANISH 1. Four quarter hours.

Reading of Spanish short stories or a conversational play. Continued practice in conversation and written use of Spanish.

Spanish 221. INTERMEDIATE SPANISH 2. Four quarter hours.

Continuation of Spanish 123. Study of geography, history and socio-economic conditions in the Latin-American countries. Written reports.

Spanish 222. ADVANCED SPANISH 1. Four quarter hours.

Reading of Spanish-American newspapers and magazines with class discussion in Spanish. Practice in composition increasingly independent of English model.

Spanish 223. ADVANCED SPANISH 2. Four quarter hours.

Continuation of Spanish 222. Reading of selected chapters from Latin-American works with class discussion. Written reports on outside reading.

HISTORY AND SOCIAL SCIENCE

History 121. AMERICAN HISTORY (1492-1840). Four quarter hours.

A general survey of the history of the United States from the period of discovery and exploration through the Jacksonian era.

History 122. AMERICAN HISTORY (1840-1900). Four quarter hours.

A continuation of History 121 covering the period from the triumph of the Whigs in 1840 through the administration of McKinley.

History 123. AMERICAN HISTORY (1900 to date). Four quarter hours.

A continuation of History 122 covering the period from the administration of Theodore Roosevelt to the present.

History 221. MODERN EUROPEAN HISTORY 1. Four quarter hours.

Political, constitutional, economic, and cultural development of western Europe from the rise of the modern state to the Congress of Vienna.

History 222. MODERN EUROPEAN HISTORY 2. Four quarter hours.

A study of modern economic imperialism resulting in armed alliances and the outbreak of World War I.

History 223. EUROPE SINCE 1914. Four quarter hours.

A study of the causes and results of World Wars I and II, with especial attention to the development of the political, economic, and cultural life of Europe.

Political Science 121. NATIONAL GOVERNMENT. Four quarter hours.

A study of the structure, functions, and operations of United States government.

Political Science 122. STATE GOVERNMENT. Four quarter hours.

A study of the general plan and functions of state government with special reference to Michigan.

Political Science 123. INTERNATIONAL ORGANIZATIONS. Four quarter hours.

A survey of the major problems arising in the field of international relations and the agencies, instruments, and organizations devised for their solution, with special reference to the problems related to the maintenance of peace.

Economics 121. ELEMENTARY ECONOMICS. Four quarter hours.

An introduction to the study of the principles of Economics, this course surveys the nature of the science, the organization and methods of production, money and credit, banking, income and expenditure, the determination of price, international trade, and distribution of income as rent, wages, interest and profits, and the relation of government to business.

Economics 122. ADVANCED ECONOMICS. Four quarter hours.

This course affords a study of economic institutions, with economic theory as a basis. The institutions observed include: the market, utilization of resources, creation and use of capital, the business enterprise, the fundamentals of labor relations, financial organizations and management, public finance, and institutions of the world economic community. Prerequisite: Economics 121 or its equivalent.

Economics 321. MONEY AND BANKING. Four quarter hours.

The two subjects indicated in the title of this course are studied in their relation to each other, under the following topic headings: the nature and kinds of money, monetary standards, past and present, banking and bank credit, especially the commercial bank and its organization and functions, the Federal Reserve System, international finance, and the various specialized lending agencies.

Economics 331. LABOR ECONOMICS AND LABOR RELATIONS.
Four quarter hours.

A study of labor economics and labor relations, with emphasis on the history of the labor movement in the United States, the development of methods and strategies by labor organizations and by management, the shift in the means of public control; and an inquiry into the factors of wages and economic security.

Economics 421. PUBLIC FINANCE AND TAXATION. Four quarter hours.

Historical survey of the growth of public expenditures, direct and indirect taxation, public borrowing and other sources of income, budgeting, etc. Special reference to Michigan state and local problems.

Sociology 221. INTRODUCTORY SOCIOLOGY. Four quarter hours.

The basic principles of the science, evolution of group life, problems of conflict and competition. The place of the family, religion, organized government, and codes of ethics in social life.

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

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

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

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

HUMANITIES

Humanities 101. PERSONAL AND CULTURAL APPRECIATION.

Three quarter hours.

A course designed to help students to greater appreciation and understanding of themselves and of their culture as a result of a systematic study of the great ideas of each period of western civilization and the influence on the artistic, dramatic, literary, and musical expressions of these periods.

Humanities 102. PERSONAL AND CULTURAL APPRECIATION.

Three quarter hours.

A continuation of Humanities 101.

MATHEMATICS

Mathematics 111. FUNDAMENTALS OF ALGEBRA. Three quarter hours.

Review of fundamental operations. Techniques of equation and problem solving. Factoring. Graphs. Exponents. Radicals. Prerequisite: One unit of high school algebra.

Mathematics 121. COLLEGE ALGEBRA 1. Three quarter hours.

Exponents. Radicals. Quadratics. Complex numbers. Binomial theorem. Determinants. Logarithms. Prerequisite: One and one-half units of high school algebra, Instructor's and Dean's permission, or Mathematics 111.

Mathematics 122. TRIGONOMETRY. Three quarter hours.

A study of plane triangles with respect to the sides, angles, functions of the angles, and their interrelation. Projection. Logarithms. Prerequisites: One unit of high school geometry and Mathematics 121.

Mathematics 123. COLLEGE ALGEBRA 2. Three quarter hours.

Exponents. Radicals. Complex numbers. Binomial theorem. Determinants. Logarithms. A more theoretical and complete treatment of same areas covered in Mathematics 121, for student planning to major in mathematics or engineering fields. Prerequisite: Mathematics 121.

Mathematics 221. PLANE ANALYTICAL GEOMETRY. Four quarter hours.

Coordinate systems, rectangular and polar. Emphasis on the straight line and conic sections. Prerequisites: Mathematics 122 and 123.

Mathematics 222. DIFFERENTIAL CALCULUS. Four quarter hours.

Consideration of the aspect of change. Increment. Rate of change. Maximums and minimums. Problem solving. Prerequisites: Mathematics 221 and Physics 221.

Mathematics 223. INTEGRAL CALCULUS. Four quarter hours.

Summation. Area under curves. Centroids. Fluid pressure. Other applications. Prerequisite: Mathematics 222.

Mathematics 321. INTERMEDIATE CALCULUS. Four quarter hours.

Series. Expansions. Ordinary differential equations. Hyperbolic functions. Prerequisite: Mathematics 223.

MECHANICAL DRAWING

Mechanical Drawing 121. Four quarter hours.

Care and use of instruments, lettering, geometric figures.

Mechanical Drawing 122. Four quarter hours.

Two and three-view drawings. Isometric and orthographic projections. Prerequisite: Mechanical Drawing 121.

Mechanical Drawing 123. Four quarter hours.

Advanced orthographic projection. Drawings of bolts, nuts, threads, and other helices. Prerequisite: Mechanical Drawing 122.

MUSIC

Music 121. ELEMENTARY MUSIC THEORY. Two quarter hours.

A study of the rudiments of music. This course includes major and minor scales, ear training, intervals, chord construction and combinations.

Music 131. HARMONY 1. Three quarter hours.

The application of major and minor scales, intervals, fundamental triads, seventh chords and their inversions, and harmonization of melodies. Prerequisite: Elementary Music Theory.

Music 132. HARMONY 2. Three quarter hours.

Continuation of Music 131, introducing secondary chords, their alterations, cadences.

Music 133. HARMONY 3. Three quarter hours.

An advanced course in harmony including modulations, transpositions, key board harmony, creative work. Prerequisite: Music 132.

Music 221. MUSIC APPRECIATION. Two quarter hours.

A survey course for the music listener with little or no formal training in music. Emphasizing the aesthetic values of music rather than the technical and analytical. Lectures and illustrations in explanation of the principal elements afford a basis for intelligent and critical judgment of illustrative works.

Music 251. CHORUS. One or two quarter hours.

The prerequisite for this course is a voice of pleasing quality and the ability to read hymn tunes.

Music 252. BAND. One or two quarter hours.

Entrance by examination to students who have had some band experience. Standard marches, overtures, and compositions of lighter nature.

Music 253. ORCHESTRA. One or two quarter hours.

Open by examination to students who play an orchestral instrument. Standard symphonies, overtures, and compositions of lighter nature.

PROFESSIONAL PHARMACY

Pharmaceutical Chemistry 211. DRUG ASSAY. Five quarter hours.

A course in chemical assay of drugs of the United States Pharmacopoea and National Formula. Analyses are made on gravimetric, titrimetric, and instrumental procedures. (3 + 6) Prerequisite: Chemistry 231.

Pharmaceutical Chemistry 311. INORGANIC PHARMACEUTICAL CHEMISTRY. Four quarter hours.

A study of preparations, tests, pharmacodynamics, outstanding incompatibilities and methods of stabilizing of inorganic chemicals used in Pharmacy. (4 + 0) Prerequisite: Chemistry 123.

Pharmaceutical Chemistry 412. ORGANIC PHARMACEUTICAL CHEMISTRY 1. Five quarter hours.

A study of relationship between the chemical structure and physiological activity, sources, production methods, properties, reactions, tests, incompatibilities, and stability of the organic chemicals used in Pharmacy. (4 + 3) Prerequisites: Biology 222, Biology 323, Chemistry 223, and Pharmaceutical Chemistry 311.

Pharmaceutical Chemistry 413. ORGANIC PHARMACEUTICAL CHEMISTRY 2. Five quarter hours.

A continuation of Organic Pharmaceutical Chemistry 1. (4 + 3) Prerequisite: Pharmaceutical Chemistry 412.

Pharmacognosy 331. PHARMACOGNOSY 1. Four quarter hours.

A study of drugs of biological origin, including crude drugs and other materials of vegetable and animal origin: sources, methods of preparation, physical and chemical properties and evaluation, constituents, and uses. Drugs of plant origin are studied in detail. (3 + 3) Prerequisite: Biology 122, 123, 212, and Chemistry 223.

Pharmacognosy 332. PHARMACOGNOSY 2. Four quarter hours.

A continuation of Pharmacognosy 331 with detailed discussion of drugs obtained from micro-organisms and animals, poisonous plants and herbicides. (3 + 3) Prerequisites: Pharmacognosy 331.

Pharmacology 421. PHARMACOLOGY 1. Four quarter hours.

An introduction to pharmacologic principles and drug action followed by a study of drugs acting primarily on the following: skin, mucous membranes, gastrointestinal tract, blood, heart circulation, and kidney. (4 + 0) Prerequisite: Biology 222 and 323; Pharmacognosy 323; Pharmacy 353.

Pharmacology 422. PHARMACOLOGY 2. Five quarter hours.

A continuation of Pharmacology 421. A study of drugs acting primarily on the following: central nervous system and peripheral nervous system including both autonomic and somatic. The laboratory work consists of a study of these types of drug action on laboratory animals. (4 + 3) Prerequisite: Pharmacology 421.

Pharmacology 423. PHARMACOLOGY 3. Four quarter hours.

A continuation of Pharmacology 422. A study of drugs employed primarily as the following: skeletal muscle relaxants, antihistaminics, oxytocics, hormones, and the anti-infective drugs including antibiotics, antimalarials, antituberculars, and sulfonamides. The laboratory work consists of a study of these types of drugs on laboratory animals. (3 + 3) Prerequisite: Pharmacology 422.

Pharmacy 151. PHARMACY ORIENTATION 1. One quarter hour.

A survey course of systematic methods of obtaining scientific information and the proper methods of arranging and presenting such material in written form. Proper usage of the library and the various types of scientific literature is stressed. (1 + 0)

Pharmacy 152. PHARMACY ORIENTATION 2. One quarter hour.

A review of the history of Pharmacy and possible future status of Pharmacy. Emphasis is placed on the history of Pharmacy in the United States and recognized professional organizations of Pharmacy. (1 + 0)

Pharmacy 153. PHARMACY ORIENTATION 3. One quarter hour.

A brief presentation of the historical basis of ethics, the evolution of ethics through the ages and current factors involved in ethical considerations of today. A justification for the various parts of the "Code of Ethics for Pharmacy" issued by the A. Ph. A. is emphasized. (1 + 0)

Pharmacy 251. PHARMACY ARITHMETIC. Four quarter hours.

A study of various systems of linear measure, weight, volume, household measures and equivalents; reducing and enlarging of formulae, calculation of doses, temperature problems, specific gravity, percentage solutions, dilutions, alcohol problems. (4 + 0) Prerequisite: Sophomore standing.

Pharmacy 351. OPERATIVE PHARMACY 1. Four quarter hours.

A study of the elementary processes used in Pharmacy; continuation of arithmetical calculations; introduction to types of pharmaceutical preparations. (3 + 3) Prerequisite: Pharmacy 251 and Physics 223.

Pharmacy 352. OPERATIVE PHARMACY 2. Five quarter hours.

A continuation of Pharmacy 351 with stress on procedures used in making the official classes of pharmaceutical preparations and the properties and use of these preparations. (4 + 3) Prerequisite: Pharmacy 351.

Pharmacy 353. OPERATIVE PHARMACY 3. Five quarter hours.

A continuation of Pharmacy 352. (4 + 3) Prerequisite: Pharmacy 352.

Pharmacy 450. A PROBLEM COURSE. 1-2 quarter hours.

Minor problems of research work in Pharmacy or related science may be pursued in this course. A thesis or term paper covering experimental and library work with accompanying bibliography on the subject pursued is required for credit in the course. Prerequisite: Senior standing.

Pharmacy 451. PRESCRIPTIONS 1. Four quarter hours.

A critical study of prescriptions for incompatibilities, dangerous doses, and other difficulties; the compounding of prescriptions of the various types to give training in the compounding of pills, ointments, powders, etc. Accuracy, cleanliness, technique, and speed are emphasized. (3 + 3) Prerequisite: Chemistry 223 and Pharmacy 353.

Pharmacy 452. PRESCRIPTIONS 2. Four quarter hours.

A continuation of Pharmacy 451. (3 + 3) Prerequisite: Pharmacy 451.

Pharmacy 453. PRESCRIPTIONS 3. Four quarter hours.

A continuation of Pharmacy 452. (3 + 3) Prerequisite: Pharmacy 452.

Pharmacy 457. MANUFACTURING PHARMACY. Two quarter hours.

Manufacturing and study of those pharmaceutical preparations which may be profitably prepared by the Pharmacist. (1 + 3) Prerequisite: Pharmacy 251 and 353.

Pharmacy 459. ANIMAL HEALTH PHARMACY. Two quarter hours.

A survey of diseases of animals and poultry, with measures for treatment and control. (2 + 0) Prerequisite: Senior standing.

Pharmacy Administration 341. MARKETING OF DRUG PRODUCTS.
Three quarter hours.

A course in marketing methods, merchandising, price policies, competitive practices, price control, etc. (3 + 0) Prerequisite: Elementary Economics.

Pharmacy Administration 342. RETAIL PHARMACY MANAGEMENT 1.
Three quarter hours.

A study of the factors pertaining to locating, acquiring, financing, and arranging layout of a retail drug store, in addition to the factors governing the purchase, receiving and selling of merchandise. (3 + 0) Prerequisite: Elementary Economics.

Pharmacy Administration 343. RETAIL PHARMACY MANAGEMENT 2.
Three quarter hours.

A study of the individual departments within a retail drug store with emphasis on selecting, training, and supervision of employees and the development of general drug store routine and housekeeping. (3 + 0)
Prerequisite: Pharmacy Administration 342.

Pharmacy Administration 441. PHARMACY LAW. Four quarter hours.

A study of the Pharmacy laws of Michigan and those Federal laws and regulations affecting the sale and distribution of drugs, narcotics, etc. (4 + 0) Prerequisite: Junior Pharmacy standing.

Pharmacy Administration 442. ACCOUNTING. Four quarter hours.

General principles of accounting with stress placed on problems encountered in drug store accounting and bookkeeping. (4 + 0) Prerequisite: Junior standing.

PHYSICAL SCIENCE

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

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

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

A continuation of Physical Science 101. Prerequisite: Physical Science 101. (3 + 2)

PHYSICS

Physics 221. GENERAL PHYSICS 1. Four quarter hours.

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

Physics 222. GENERAL PHYSICS 2. Four quarter hours.

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

Physics 223. GENERAL PHYSICS 3. Four quarter hours.

Magnetism. Electric currents and circuits. Magnetic and chemical effects of electric currents. Generators and motors. Radio and electronics. X-rays and radio-activity. Prerequisite: Physics 221. (3 + 3)

Physics 450. THEORY OF PHOTOGRAPHY. One quarter hour.

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

PHYSICAL EDUCATION AND HEALTH EDUCATION

Health Education 121M or 121W. ½ quarter hour.

This course is required of all freshmen and transfer students. Nutrition, harmful drugs, rules of etiquette, mental hygiene, communicable and other diseases are some of the topics covered. Fall quarter. One hour per week.

Health Education 122M or 122W. ½ quarter hour.

This course is required of all freshmen students. Body physiology, body conditioning, the later years, and personal hygiene are some of the topics covered. Winter quarter. One hour per week.

Health Education 123M or 123W. ½ quarter hour.

This course is required of all freshmen students. Reproduction, marriage and family life, safety and accident prevention, elemental first aid, public health and sanitation, and some medical care are topics of consideration. Spring quarter. One hour per week.

Physical Education 121M or 121W. ½ quarter hour.

This course is required of all freshmen students. Fundamentals, rules, and actual participation in organized team and individual in-season sports with emphasis on carry-over values. Fall quarter. Two hours per week.

Physical Education 122M or 122W. ½ quarter hour.

Continuation of 121M or 121W. Winter quarter. Two hours per week.

Physical Education 123M or 123W. ½ quarter hour.

Continuation of 122M or 122W. Spring quarter. Two hours per week.

SECRETARIAL TRAINING

Secretarial Training 121. BEGINNING TYPEWRITING. Four quarter hours.

Mastery of the keyboard through use of manual exercises and drills, to obtain a minimum speed of 25 words per minute.

Secretarial Training 122. ADVANCED TYPEWRITING 1. Four quarter hours.

A review of the keyboard; an introduction to business letter forms; speed building. Required of all stenographic and secretarial majors. Prerequisite: Secretarial Training 121 or equivalent.

Secretarial Training 123. ADVANCED TYPEWRITING 2. Four quarter hours.

Emphasis on business letter forms; tabulation, rough draft; manuscript and legal typewriting. Required of all stenographic and secretarial majors. Prerequisite: Secretarial Training 122 or equivalent.

Secretarial Training 124. APPLIED TYPEWRITING. Two quarter hours.

More intricate tabulation, rough draft, letter corrections, use of the mimeograph and liquid duplicator. Laboratory work in which practice is required on matter for actual office use. Prerequisite: Speed of fifty words per minute.

Secretarial Training 131. ELEMENTARY SHORTHAND. Four quarter hours.

All basic principles of Gregg Shorthand Simplified (Functional Method) are covered in the first term of work. A high degree of skill in reading shorthand is developed. Attention is given to the development of appropriate speed in writing simple new-matter dictation. The ability to write familiar material at a minimum rate of 70 words per minute and new material at a minimum rate of 50 words per minute for three minutes is developed in this first course.

Secretarial Training 132. INTERMEDIATE SHORTHAND. Four quarter hours.

The work of this course continues the emphasis upon building the appropriate high skill in reading and writing Gregg Shorthand. Emphasis is given to the ability to develop new outlines according to the basic principles as these outlines are met in new-matter dictation. A minimum dictation skill of 80 words per minute on familiar material and 60 words per minute on new material for five minutes is expected at the conclusion of this course. Prerequisite: Secretarial Training 131 or equivalent.

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

Continued emphasis is placed on developing the ability to write new-matter dictation. A minimum dictation skill of 100 words per minute on familiar material and 80 words per minute on new material for five minutes is required. In addition, the student is introduced in this course to basic transcription techniques. Appropriate time is devoted to building speed and accuracy in transcribing new-matter dictation on the typewriter. A minimum transcription rate of 20 words per minute is expected. Prerequisites: Secretarial Training 122 and 131 or equivalent.

Secretarial Training 221. BUSINESS ENGLISH. Four quarter hours.

Practical application of English to the needs of business. Brief review of essentials of grammar and punctuation. Types of business correspondence are assigned as written exercises. Extensive study of original letters that have been successfully used in business.

Secretarial Training 231. BEGINNING TRANSCRIPTION. Four quarter hours.

The work of this course is designed to increase the ability to take dictation at a minimum rate of 100 words per minute on new-matter and to transcribe it at a minimum rate of 25 words per minute. Considerable experience will be provided in transcribing, with attention of the students directed toward

the development of the typewriting, shorthand, and technical English skills necessary for efficient transcription work. Prerequisite: Secretarial Training 122 and 133 or equivalent.

Secretarial Training 232. ADVANCED TRANSCRIPTION. Four quarter hours.

Continued emphasis is placed on increasing ability to take new-matter dictation. Appropriate time will be devoted to building a high degree of skill in transcribing letters of all lengths, memoranda, articles, and reports. Typewriting, shorthand, and technical English skills will be developed further. Students will be expected to have commercially usable dictation and transcription skill upon the completion of the course. Prerequisite: Secretarial Training 231.

Secretarial Training 241. OFFICE PRACTICE. Four quarter hours.

This course is a terminal course and is primarily vocational in character. It consists of three phases of work: (1) Study and analysis is made of the basic rules of indexing and filing as they relate to the common systems of filing—alphabetic, geographic, numeric, and subject. Considerable practice is given in applying the rules through use of miniature filing outfits. (2) Practice is given in taking office-style dictation at mixed rates of speed to develop ability to meet office standards of dictation and transcription under conditions similar to those on the job. Practice in taking direct dictation on the typewriter is also given. (3) Students will also be taught the proper procedures for keeping office machines in condition, such as cleaning, oiling, changing ribbons, making minor repairs and adjustments, etc. Prerequisite: Secretarial Training 133 and 122.

Secretarial Training 251. VOICE TRANSCRIPTION. Two quarter hours.

The aim of this course is to produce commercially usable voice-transcription skill. Students will be taught to operate the belt- and cylinder-type Dictaphones and the disc- and cylinder-type Ediphones. Considerable transcription practice will be given on all machines. Attention of the students will be directed toward the development of the typewriting and technical English skills necessary for efficient transcription. Prerequisite: Secretarial Training 122.

Secretarial Training 252. OFFICE MACHINES. Two quarter hours.

Practice is given which is aimed at developing a minimum skill in operating the most commonly used office machines. Training in fundamental mathematical processes is given on the crank- and motor-driven calculators: Allen, Friden, Monroe, and Marchant; key-driven calculators: Comptometer and Burroughs; adding machines: Victor ten-key selective keyboard and Burroughs full keyboard. Required of stenographic and secretarial students; strongly recommended for prospective teachers and business administration students. No prerequisites.

Secretarial Training 253. OFFICE MACHINES. Two quarter hours.

Practice is given which is aimed at developing a minimum skill in cutting stencils and masters and in operating the Mimeograph, Mimeoscope, Multi-

lith, Liquid Process Duplicator, Vari-Typer, and IBM and Underwood Electric typewriters. Required of stenographic and secretarial students; strongly recommended for prospective teachers. Prerequisite: Secretarial Training 122.

Penmanship. No credit.

This is a non-credit hour course designed for the purpose of improving the general appearance of the student's handwriting, and emphasizes methods of developing ease and rapidity in writing. Required of all commerce and teacher-training students. Meets two days a week for one term.

Spelling. No credit.

A non-credit hour course for the purpose of improving the spelling ability of the students. Words selected from business vocabulary. Required of commerce and teacher-training students. Meets two days a week for one term.

Description of High School Courses

The Roman numerals with the subjects listed below indicate the courses or terms in which the subjects are offered. For instance, Algebra II indicates second term of first year Algebra; Algebra III indicates first term of second year Algebra. It will be noted that English I is not offered. It has been found that adult students obtain sufficient rhetoric, composition, and grammar in English II, III, IV. Each of the courses listed here allows one half unit of credit, with the exception of Music, Dramatics, and Physical Education.

English II

Basic grammar and punctuation.

English III

Grammar and composition.

English IV

Advanced writing.

English V

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

English VI

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

English VII

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

English VIII

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

American Government

A study of the Constitution. Basis of our government and of problems of national and world significance.

Problems of Democracy

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

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, Reconstruction, conditions leading to rise of business.

United States History II

Period 1870 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."

History of England I

Prehistoric period to 1660: prehistoric Britain, Roman Britain, Saxon England, Danish and Norman invasions, national unity and formation of the English nation, Hundred Years' War, the Tudors, Elizabeth, Stuarts, Great Rebellion and the Commonwealth.

History of England II

Period 1660 to the present: the Restoration, rise of naval power, foundation of the Empire, Industrial Revolution, American Revolution, 19th century reforms, World War I, postwar depression, causes of World War II, United Nations, decline of the Empire.

Sociology

Method of social sciences. Evolution of group life, of culture. Marriage, family, education. Principles of economic and political organization. Social control.

Economics

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

Geography

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

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; communication; transportation; plants; animals; conservation. Discussions, demonstrations, reports.

Botany I

The structure of the plant, the cell, the leaf and the root. Lecture, recitation, and laboratory.

Botany II

A study of the divisions of the plant kingdom with a study of representative life history of each. Lecture, recitation, and laboratory.

Zoology I

A study of the structures, habits, of the lower animal forms. Lecture, recitations, and laboratory.

Zoology II

A study of the vertebrates, the greater part devoted to the Chordatas and Arthropoda. Lecture, recitation, and laboratory.

Physiology and Health

A study of the problems of physical and mental health of the individual and of the group.

Chemistry I

A beginning course covering fundamental principles; a study of some of the most important and most common elements and their compounds; problems. Laboratory. Prerequisite: $\frac{1}{2}$ unit of algebra is desirable.

Chemistry II

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

Speech and Debating

To assist the student to talk effectively and easily in everyday speaking situations, improve vocabulary and self-confidence.

Physics I

Mechanics; properties of matter; heat. Prerequisite: working knowledge of algebra and plane geometry.

Physics II

Magnetism; electricity; sound; light; electronics; nuclear study. Prerequisite: Working knowledge of algebra and plane geometry.

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.

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).

Algebra IV

Continuation of Algebra III. Binomial theorem, logarithms, series, permutations, combinations, and complex numbers.

Plane Geometry I

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

Plane Geometry II

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

Solid Geometry

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

Trigonometry

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

Spanish I

Fundamentals of grammar, pronunciation, conversation, selected readings.

Spanish II

Grammar, translation, reading and conversation.

Spanish III

Grammar, reading, composition.

Spanish IV

Composition, oral drill; history and geography of Latin-American countries and Spain.

Psychology

Study of the mind; lecture, readings, discussion.

Mechanical Drawing I

Care and use of instruments, lettering, geometric figures.

Mechanical Drawing II

Two and three-view drawings; isometric and orthographic projections.

Mechanical Drawing III

Advanced orthographic projection; drawings of bolts, nuts, helices.

Advanced Mechanical Drawing

Three quarters leading to engineering drawing proficiency.

Bookkeeping I

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

Bookkeeping II

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

Advertising

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

Business Arithmetic

Fundamental principles, percentage, profit and loss, interest, etc.

Salesmanship

Preparation, approach, personality; arousing interest, creating desire, obtaining action.

Commercial Law

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

Business English

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

Typewriting I

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

Typewriting II

Letters and forms; fifty to sixty words per minute.

Shorthand I

First 18 units, brief forms, vocabulary, dictation.

Shorthand II

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

Physical Education - Music - Dramatics

Note: The College Preparatory Department is in session four quarters each year.

Description of Trade Courses

AUTOMOTIVE

A.101—Engine Familiarization: Three hours a week.

A study of the oiling system, cooling system, fuel system, ignition system, and component parts of the automobile engine.

A.102—Automotive Practice 1: Twenty hours a week.

Actual tear down and reassembly of the "mock up" engine. Instruction includes use of technical manuals, reference books, the use of special tools, and the procedure for removal and replacement of the engine in the chassis.

A.103—Automotive Machine Shop: Three hours a week.

A study of the valve grinder, boring bar, bench grinders, commutator lathe, Sumner hone, drum lathe, and other power tools in the shop.

A.104—Automotive Brakes 1: Two hours a week.

A study of the hydraulic theories relating to automotive hydraulic brakes, the coefficient of friction as a problem in braking, and component parts of a brake system.

A.105—Automotive Practice 2: Twenty hours a week.

Actual overhaul of engines of a variety of types including in-line engines, V-eights, overhead V-eight, straight eights, and sixes.

A.106—Engine Rebuilding: Two hours a week.

A course covering details of rebuilding, including discussion on pistons, crankshafts, camshafts, boring, grinding, and replacement parts. Discussion on re-ring, overhaul, and rebuilding.

A.107—Automotive Brakes 2: Two hours a week.

This course provides instruction on the standard types of automobile brakes in use today. Overhaul procedures and trouble shooting are discussed with demonstrations being given on this brake, Dokter, and Selmer.

A.108—Automotive Practice 3: Twenty hours a week.

The major emphasis of instruction is on engine rebuilding and overhaul of brake systems.

A.109—Automotive Diagnosis 1: Three hours a week.

The operation of testing equipment is covered in detail and demonstrations are given in all areas covered.

A.110—Automotive Carburetors: Two hours a week.

Theory of carburization and discussion of single barrel, double barrel, and four barrel carburetors.

A.111—Automotive Practice 4: Twenty hours a week.

Principle emphasis of this laboratory is the testing of engines including fundamentals of tune up and diagnosis.

A.112—Automotive Diagnosis 2: Two hours a week.

A discussion of the underlying theory of meters and testing equipment. Voltage regulators, generators, and batteries are covered in great detail.

A.113—Engine Performance: Three hours a week.

A study of combustion as it takes place inside the engine at different road speeds and loads. Spark advance curves are studied in their relationship to performance.

A.114—Automotive Practice 5: Twenty hours a week.

Testing automobiles with faults difficult to detect. Actual cases of "hard-to-find" trouble are worked on and recommendations for repair are made as a result of scientific analysis.

A.115—Automotive Transmissions: Three hours a week.

Operation of the standard, semi-automatic, and fully automatic transmissions are discussed.

A.116—Service Floor Operation: One hour a week.

Lectures cover the operation of small garages to the large garages, listing jobs, requirements, promotion, and operation by position.

A.117—Special problems: Twenty hours a week.

Students work on an area of specialization of their own choosing providing the instructor approves of the project.

DRAFTING

Arch. Dr. 101: Two hours a week.

This course is primarily designed to provide the basic knowledge of the principles of drawing, and the teaching of basic techniques used in the drafting room. Architectural lettering, architectural symbols, types of floor and wall construction and simple dimensioning are studied.

Arch. Dr. 102—Laboratory 1: Fifteen hours a week.

This course provides practical application of the theoretical knowledge of architectural drawing 101. Skill is developed in the use of drawing instruments. Simple plans of garages are worked out in detail.

Arch. Dr. 103: Two hours a week.

In this course the student studies the proper methods of free hand sketching. Details of windows, doors, stairs, and trim are studied. Using the Builder's Handbook.

Arch. Dr. 104—Laboratory 2: Fifteen hours a week.

Free hand sketches of simple floor plans, window details, doors and stairs are developed.

Arch. Dr. 105: Two hours a week.

Emphasis is placed on the study of the underlying principles of design and planning of one and two story houses. Study of carpentry construction methods.

Arch. Dr. 106—Laboratory 3: Fifteen hours a week.

Plans are drawn, elevation, details and specification lists are completed for varied types of projects.

Arch. Dr. 107: Three hours a week.

Information concerning natural and manufacturer's materials which the architect must be familiar with in order to plan and construct any modern architecture. Study of reinforced concrete construction and strength of materials.

Arch. Dr. 108—Laboratory 4: Fifteen hours a week.

Projects are drawn covering matters studied in drawing 107.

Arch. Dr. 109: Three hours a week.

Estimating fundamentals for residence work is covered. Divisions such as foundations, framing, exterior finish, interior finish, and hardware are studied.

Arch. Dr. 110—Laboratory 5: Twenty-one hours a week.

The class estimates one complete house plan together. Each student estimates the material and costs of one of the house plans which he has designed.

Arch. Dr. 111. Three hours a week.

An illustrative example is set up. The problem is to determine the needs and desires of a family desiring to build a house.

Arch. Dr. 112—Laboratory 6: Twenty hours a week.

The student draws house plans to the exact specifications of a prospective building. Sketch plans, elevations, etc.

Mech. Dr. 101: Two hours a week.

Introductory course in drafting fundamentals involving lettering, free hand sketching, orthographic projection, auxiliary views, sectioning, instrument drawing, and conventional practices through job assignments. Models are used freely to help the student understand the relationship between the drawing and the actual object.

Mech. Dr. 102—Laboratory 1: Fifteen hours a week.

The laboratory course for mechanical drawing 101 aims to develop the basic manipulation skills which will be used throughout the entire course. Special attention is given in the use of proper pencils, instruments, and conventional practice. Emphasis is placed on the cleanliness and accuracy of the drawings, as well as the clearness and quality of the lines drawn.

Mech. Dr. 103: Two hours a week.

Fundamentals covered in mechanical drawing 101 are applied to more complex drawing problems which include detail and assembly of simple machine parts, jigs, and fixtures and similar assembly.

Mech. Dr. 104—Laboratory 2: Fifteen hours a week.

This course aims to strengthen what has already been assimilated in laboratory 1, by means of using more complex assignments. Students learn to make prints on the blue print machine as a means of checking line quality of their drawings.

Mech. Dr. 105: Two hours a week.

An introductory course in the basic factors of drill and jig design. Information regarding the machines on which these jigs and fixtures are to be used are discussed in detail. In the latter part of this course, conventional representation of some common screw threads and their application in standard fastening devices, such as bolts, nuts, and screws. Study is made of stress in machines and mechanical parts.

Mech. Dr. 106—Laboratory 3: Fifteen hours a week.

This laboratory course aims to give the student practical knowledge and experience in the layout and use of simple jigs and fixtures.

Mech. Dr. 107: Three hours a week.

In this course students study the actual designing of jigs and fixtures. All previous study in the mechanical drafting course is basic. The fundamental concepts formulated in mechanical drawing 105 are strengthened by the introduction of more complex jigs and fixtures. Instruction is given in the use of various types of gauges. In the latter part of this course, attention is given to the intersection and development of various geometrical solids, and sheet metal layout.

Mech. Dr. 108—Laboratory 4: Fifteen hours a week.

This laboratory course aims to give the student freedom in his drawing as well as positive use of his previous knowledge and skills in his drafting to develop creativeness in his work. This course provides laboratory work in designing jigs and fixtures and in making sheet metal layouts and models.

Mech. Dr. 109: Three hours a week.

Layout and design of machine tools with attention given to production methods and manufacturing costs; the mechanics and use of **Modern Handbook**. The student also learns to use the drafting machine.

Mech. Dr. 110—Laboratory 5: Twenty-one hours a week.

Laboratory work in machine tool design.

Mech. Dr. 111. Three hours a week.

Advanced drafting in machine tool design and simple layout and design blanking, forming, piercing and other dies.

Mech. Dr. 112—Laboratory 6: Twenty hours a week.

Advanced laboratory work covering machine tool and die designing.

Surveying 101.

This course deals with the construction, care, adjusting and use of surveying instruments, including use of tape, compass, level, and transit, with practice in making simple maps, traverse closure, and area computations.

PRINTING

P.101—Hand Composition: Three hours a week.

History of printing, equipment, type style, processes, apprenticeship, printer's measure, proofreading, type series and families, type metals.

P.102—Hand Composition Projects 1: Fifteen hours a week.

Fundamentals of typesetting by hand, shop safety, operations of saws, miterers, routers, proof presses; identification of type rules, spacing materials, their location and care.

P.103—Hand Composition Projects 2: Twenty-one hours a week.

Same as P.102 with additional work in: half-tones, stereotypes, borders, rules, tabular composition, and initial letters.

P.104—Job Composition: Two hours a week.

Principles of layout and design, use of margins and white spacing, make-up of dummies, lock-up of pages, copy fitting and estimating time for composition, use of trade plants.

P.105—Job Composition Projects 1: Fifteen hours a week.

Advanced composition practice in news composition, office forms, advertising pieces, brochures, and catalogs.

P.106—Job Composition Projects 2: Twenty-two hours a week.

Same as P.105 with the addition of: layout of booklets; folding; page make-up; perforated forms; padding and stitching; planning job details in advance of composition.

P.107—Imposition and Presswork: Three hours a week.

Principles of lock-up, single and multiple pages, care of presses, rollers, inks, and stock.

P.108—Imposition and Presswork Projects 1: Fifteen hours a week.

Lock-up forms for presses; matching inks to paper; use of paper cutter and binding processes; actual press feeding on live jobs.

P.109—Imposition and Presswork Projects 2: Twenty-one hours a week.

Same as P.108 with the addition of: beginning two and three color jobs, use of process plates and inks. Half-tone makeready, underlays and overlays.

P.110—Automatic Presswork: Three hours a week.

Principles and operation of automatic presswork, kinds, styles, speed advantages of one or another, choosing correct press for job.

P.111—Automatic Presswork Projects 1: Fifteen hours a week.

Actual jobs on presses; half-tones and line cuts made in laboratory and run; time checks for speed and accuracy stressed.

P.112—Automatic Presswork Projects 2: Twenty-five hours a week.

Same as P.111 with the addition of: scheduling and estimating stock, inks, speeds, control of "down-time" and production planning.

P.113—Linotype Operation: Three hours a week.

Mechanism and principles of operation, maintenance schedules and procedures, specifications for composition.

P.114—Linotype Operation Projects 1: Fifteen hours a week.

Training in care and operation of linotype, keyboard fingering, setting straight matter, beginning simple job composition and elementary maintenance.

P.115—Linotype Operation Projects 2: Twenty-five hours a week.

Same as P.114 with the addition of: word practice, word division, news composition and tabular work.

P.116—Linotype Operation and Maintenance: Two hours a week.

Means of obtaining speed and accuracy, care of machine and mats, purchasing of parts, mats, border slides, and special mats.

P.117—Linotype Operation and Maintenance Practice: Twenty-five hours a week.

Job composition on production forms and advertising for Ferris Institute, booklets, laboratory manuals, programs. Actual installation of repair parts and maintenance as practiced in small shops where the operator must keep up his own machine.

P.118—Production Control: Two hours a week.

Principles of shop control, job estimating, scheduling, use of job tickets, quality control, purchasing practices.

P.119—Production Control Practice: Fifteen hours a week.

Layout of job from job ticket, planning complete job; purchase of stock, inks, cuts; choosing proper process of production, estimating size and cost. Check-up on accuracy of figures when job is completed. Work is done in close cooperation with instructors.

P.120—Photo-processes and Multilith: Three hours a week.

Photo-engraving and offset theory, camera work, negatives, positives, reducing and enlarging. Discussion of plates available.

P.121—Photo-processes and Multilith Projects: Fifteen hours a week.

Actual making of negatives, zinc plates and line cuts, for letter press; making various types of plates for offset. All plates run on proper press for practice and proving of quality.

P.122—Management and Supervision of Complete Shop: Three hours a week.

Proper layouts for efficient production, shop planning; production and quality control planning. Stock control and records.

P.123—Management and Supervision of Complete Shop Projects: Fifteen hours a week.

Practice in supervising jobs through the shop, working with student personnel and instructors. Students to actually run the production work of the school shop.

RADIO

Radio 101: Five hours a week.

The study of sound and light waves, basic theory of electricity, structure of matter, batteries, resistance and resistor types; insulators; Ohm's law; series, parallel, and combination circuits; magnetism; electro-magnetism; meters; bridges; capacitance and capacitor types; inductance, coils, and transformers.

R.102—Laboratory 1: Fifteen hours a week.

Laboratory experiments and job sheets in electricity and magnetism; care and use of tools; making connections; soldering; use of meters; color codes; testing and replacement of tubes.

R.103—Radio Mathematics: Five hours a week.

Includes elementary algebra—addition, subtraction, multiplication, division, equations; slide rule; powers of ten; and conversion of units using powers of ten.

Radio 104: Four hours a week.

Vacuum tubes, gaseous tubes, voltage regulation, characteristic curves, power supplies—full wave, half wave, filter circuits; AC-DC supplies; auto-radio power supplies—dynamotors, synchronous and non-synchronous vibrator circuits; power and amplifier circuits—single tube and push pull operation; and audio-frequency voltage amplifiers.

R.105—Laboratory 2: Fifteen hours a week.

Laboratory experiments with vacuum tubes; construction of power supply, power amplifiers, and a-f voltage amplifier stages; also servicing home and auto radios.

R.106—Radio Mathematics 2: Five hours a week.

Solving problems concerned with d-c series circuits, d-c parallel circuits, resistance, and wire sizes is a part of this course. A later part concerns elementary trigonometry—angles, trigonometric functions, and tables of functions.

Radio 107: Four hours a week.

Radio stages and circuits are studied: Detectors—diode, plate, grid-leak, heterodyne, regenerative; superregeneration; automatic volume control; intermediate frequency amplifiers; converters-mixers and oscillators; super-heterodyne principles; and radio frequency amplifiers.

R.108—Laboratory 3: Fifteen hours a week.

This work entails construction of typical stages, analysis, and testing of these circuits. Servicing of home radios, auto radios, and other electronic equipment is also done.

R.109—Radio Mathematics 3: Four hours a week.

This is a continuation of trigonometry with problems concerning the following: solution of right triangles, periodic functions, elementary plane vectors, alternating-current series circuits.

Radio 110: Four hours a week.

Antennas of different types; auto radio installation and interference problems encountered; record players and automatic changers; frequency modulation; servicing procedure; service bench layout; and business procedures.

R.111—Laboratory 4: Fifteen hours a week.

Extensive servicing of home radios, auto radios, and other electronic equipment. All types of test equipment are used including oscillographs, A-M and sweep generators, vacuum tube voltmeters, and the more common multimeter.

R.112—Radio Mathematics 4: Four hours a week.

Trigonometry is used to solve problems of alternating current parallel circuits. The "j" operator is used to solve impedance problems. Vector algebra is also used to solve radio and electrical problems.

TELEVISION

Television 101: Four hours a week.

Among the topics studied are the television system, camera tubes, the electron scanning beam, the composite video signal, picture carrier signal, frequency modulation, picture tubes, and TV power supplies.

Tel. 102—Laboratory 1: Twenty hours a week.

Television antenna installation and antenna-rotor mechanisms are encountered. Installation adjustments of the television receiver, elementary television receiver servicing, and TV boosters are included.

Tel. 103: Four hours a week.

Video amplification, practical design of video amplifier circuits, brightness control and D.C. reinsertion, video detector and automatic gain control, separation of the synchronizing signals, and deflection circuits.

Tel. 104—Laboratory 2: Twenty hours a week.

Construction of a television receiver kit and testing the circuits for typical operating potentials and wave forms. Servicing of television receivers is also done.

Tel. 105: Four hours a week.

Picture intermediate-frequency stages, the radio-frequency tuning section, antennas and transmission lines, the associated sound signal and FM receivers, receiver servicing survey.

Tel. 106—Laboratory 3: Twenty hours a week.

Television test equipment kits are constructed in this course. Television receiver servicing is done including alignment with meters and the oscillograph. Waveform analysis is stressed.

Tel. 107: Four hours a week.

Light and projection receivers, ultra high frequency television, very high frequency tuners and adaptation to UHF reception, color television, television broadcasting.

Tel. 108—Laboratory 4: Twenty hours a week.

Ultra-high-frequency converters and methods of adapting UHF tuners for UHF reception. Servicing and waveform analysis of television receivers as well as alignment of separate channel and intercarrier sets.

REFRIGERATION AND AIR CONDITIONING

Refrig. 101: Five hours a week.

This is a basic course in the principles of refrigeration and electricity. Among the subjects included are the correct use of tools and shop equipment; the domestic refrigerator and its numerous parts including AC and DC motors.

Ref. 102—Laboratory 1: Fifteen hours a week.

This laboratory course provides practical application of the theoretical aspects of Refrigeration 101. Skill is developed in the bending, flaring, swedging, soldering, and forming of copper tubing. Students learn to handle the various refrigerants and receive practice in the use and care of shop tools and equipment.

Ref. 103: Five hours a week.

This course provides instruction in the refrigerator cycle; low side and high side float systems; compression and absorption of domestic refrigerators; types of compressors, evaporators, condensers, compressor valves, and capillary tubes.

Ref. 104—Laboratory 2: Fifteen hours a week.

Practical application under shop conditions of the matters studied in Refrigeration 103. Particular attention is given to the overhauling of compressors and adjustment and repair of floats, evaporators, valves, etc.

Ref. 105: Five hours a week.

The domestic refrigerator, the cabinet, refrigerator parts, refrigerant cylinders, types of refrigerants, heat exchangers, oil separators, dryers, filters, AC motors and repulsion-induction and capacitor-start AC motors, DC motors, thermostatic and pressure motor controls; peculiarities of the sealed unit.

Ref. 106—Laboratory 3: Fifteen hours a week.

This course provides laboratory work in refrigerant charging and discharging; handling of non-condensable gases; general overhauling of equipment, and the servicing of all types of domestic refrigerators.

Ref. 107: Five hours a week.

Study of small commercial refrigeration units, regulations, and codes. Overhauling the equipment; the balanced system, the check chart; construction and the use of the test lamp and test cord; failures of compressors, evaporators, condensers, receivers, motors, motor controls, and tubing connections; refrigerant charging and discharging; non-condensable gases; organization of the service shop.

Air Con. 104: Five hours a week.

Advanced study of subjects begun in Air Conditioning 101. Attention is given to the various types of air conditioning units with emphasis on late models and low temperatures. Individual projects are selected.

Air Con. 105—Laboratory 2: Eighteen hours a week.

Continuation of shop practices in the operation, service, repair and testing of air conditioning equipment; construction of special projects, such as low temperature cabinets and heat pumps.

Air. Con. 103—Lay-Out and Planning 1: Three hours a week.

This course includes the planning and design of refrigeration and air conditioning systems. It involves the selection of equipment, the planning, installation, and determination of the cost involved in various types of installation.

Air Con. 106—Lay-Out and Planning 2: Three hours a week.

Continuation of Air Conditioning 103.

Ref. 108—Laboratory 4: Twenty hours a week.

Shop work in servicing and repairing refrigerant equipment as studied in the Theoretical Course 107. Regular service calls are made to provide the student with practical experience and customer relationships.

Ref. 109: Five hours a week.

Study of the larger commercial refrigeration equipment; cabinets and mechanism; calculations of heat loads, capacities of condensing units and cooling coils; refrigerant line sizing; refrigerant controls.

Ref. 110—Laboratory 5: Twenty hours a week.

Practical experience in repairing and servicing commercial equipment as studied in course 109.

Ref. 111: Five hours a week.

Advanced study of subjects begun in Refrigeration 110 with emphasis on multiple type installations and special equipment.

Ref. 112—Laboratory 6: Twenty hours a week.

Continuation of Shop practice in commercial refrigeration as begun in the previous course.

Air Con. 101: Five hours a week.

Study of temperature and humidity control; the properties, circulations, and filtration of air; special structures, instruments, and equipment for cooling, heating, cleaning, humidity control, and circulation; package units; testing equipment; ventilation systems, fans, filters, ducts, registers and noise control. Topics include properties of air, cooling and dehumidifying, selection of washers and coils for air conditioning systems, calculation of air conditioning load.

Air Con. 102—Laboratory 1: Eighteen hours a week.

Practical application of the theoretical aspects of air conditioning which are studied in course 101. Students learn to operate, service, and test air conditioning equipment. It includes training in trouble shooting commercial equipment. Multi-plexing, multi-temperature, and low temperature problems are worked out. Various types of refrigerant metering devices and controls are applied and checked under operating conditions with variable load factors

Description of Related Subjects

Note: If any of these subjects are not listed as required in a trade course, they may be substituted for an allied subject.

T. 101—Drawing: Two hours a week.

This course deals with the application of mechanical and architectural drawing principles to the layout of heating, refrigeration and air conditioning systems, and to the wiring and installation of radio, television, and electronics equipment. It includes blueprint reading, lettering symbols, conventions, and terminology used in trade study.

T. 102—Shop Mathematics 1: Two hours a week.

Courses are organized in sections graded according to student's ability and preparation. Study of and review of arithmetic, fundamentals, intuitive geometry, elementary algebra and the slide rule as required for the major trade field.

T. 103—Shop Mathematics 2: Two hours a week.

Continuation of Shop Mathematics 1.

T. 104—Applied Physics 1: Two hours a week.

Fundamental units of measurement, properties of matter, heat (except mechanical), equivalent of heat, heat transfer, thermodynamics, sound (brief treatment).

T. 105—Applied Physics 2: Two hours a week.

Vectors, equilibrium of simple structures, kinematics, dynamics including friction, impulse and momentum, Newton's laws, laws of gases, machines, energy, and power.

T. 106—Human Relations: Three hours a week.

Factors of human nature; psychological laws of emotion, suggestion, and conduct; personality development; personal problems; and principles of individual and group control. Cases which illustrate principles of the course are presented through films, recordings, and lectures.

T. 107—Economics: Two hours a week.

Analysis of the problems of capital and management; labor problems and organization; the economic laws affecting prosperity; factors of consumption, production, distribution, and exchange; applied psychology in business and industry from the individual's point of view.

T. 108—Social Problems: Two hours a week.

A study of the origin and nature of the major political, economic, international and educational problems of our Technological Age. Particular emphasis is given to the role of the industrial revolution and the urbanization of life in creating and providing means of solving these problems.

T. 109—Small Business Management: Four hours a week.

This course includes problems of small business operation, basic business law, business forms, letters, and records, financial and tax problem, location problems, ordering and inventory, layout, salesmanship, selling techniques, advertising.

ALLIED SUBJECTS

Descriptions which have not been given for the subjects below are described elsewhere in this catalog together with the number of class hours each meets per week. These are described in the Ferris division indicated. Most of these subjects meet four or more times a week, but some are not offered every quarter.

High School	General College and Pre-professional	Commerce
Algebra	Algebra	Advertising
English	Analytical Geometry	Bookkeeping
Plane Geometry	Biological Science	Business Arithmetic
Physics	Calculus	Business English
Trigonometry	Communications	Commercial Law
Mechanical Drawing 101	Cultural Appreciations	Salesmanship
Mechanical Drawing 103	Physical Science	Spelling
	Physics	Typewriting
	English	
	Social Science	
	Speech	
	Trigonometry	

RADIO STUDY FOR F.C.C. LICENSE PREPARATION

The informal group work described below, non-credit in nature, is designed to help those who wish to qualify for F.C.C. licenses. Study groups will be formed when a sufficient number of students are interested, and will be carried on with the counsel of the radio instructor. These study groups will meet in the later afternoon or evening at such times as are agreeable between students and counselor.

Code I: beginning study of code practice. Receiving and transmitting. Message procedure of an elementary nature.

Code II: advanced code practice, intended to increase speed of receiving and transmitting. Advanced message procedure and the use of "Q" signals.

Transmitters: study of transmitter circuits- design, operation, testing, and servicing.

Radio Broadcasting I: intended for persons interested in receiving an F.C.C. commercial license. The main goal of this activity is to prepare for third-class examination which includes laws and operating procedures.

Radio Broadcasting II: intended to prepare for second-class commercial license. Study of laws and advanced theory.

Radio Broadcasting III: intended to prepare for first-class commercial license.

Radio Drawing: advanced radio and television schematic drawing; electric wiring diagrams; chassis layout, and the like.

Description of Subjects in Cosmetology Curriculum

Cosmetology 101. Five hours per week.

Personal hygiene, bacteriology, sanitation, chemistry of solutions, shampooing, hairdressing, permanent waving, safety measures, handling of bleached and dyed hair, vocabulary.

Cosmetology 102. Nineteen hours per week.

Laboratory work in shampooing, pin curls, finger waving, sculpture curls, brushing, towel drying, regulating temperature of dryer, regulating temperature of water, and demonstration work in permanent waving.

Cosmetology 103. Five hours per week.

Introduction to scalp treatments, dry shampoos, egg shampoos, continuation of hairdressing and permanent waving.

Cosmetology 104. Fourteen hours per week.

Laboratory work in scalp treatment, brushing and massaging, elementary hairdressing, and practice of permanent waves on blockheads.

Cosmetology 105. Five hours per week.

Permanent waving, different methods of hairdressing, facial massage, manicuring and pedicuring.

Cosmetology 106. Fourteen hours per week.

Laboratory work in permanents, manicuring, and pedicuring.

Cosmetology 107. Five hours per week.

Study of hair and hair cutting, cosmetics, hair coloring, elasticity and texture of hair.

Cosmetology 108. Seventeen hours per week.

Laboratory work and facial treatments, advanced work in permanents, haircutting, cosmetics, and hair coloring.

Cosmetology 109. Five hours per week.

Hair coloring, massage, manicuring and pedicuring, hairdressing, permanent waving, and office records.

Cosmetology 110. Seventeen hours per week.

Laboratory work in coloring and bleaching, permanents, massage (electrical and manipulation), manicuring and pedicuring.

Cosmetology 111. Five hours per week.

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

Cosmetology 112. Twenty hours per week.

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

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