

COURSE DESCRIPTIONS

ACCOUNTING

ACCT 255 Governmental & Non-Profit Accounting

3 semester credits

This course provides the fundamental knowledge necessary for understanding the operation of governmental and nonprofit entities and their accounting and financial reporting.

ACCT 261 Principles of Accounting I

3 semester credits

This course introduces the student to financial accounting. It includes recording transactions, making adjustments, and preparation of financial statements. Detailed coverage of accounting for cash, receivables, inventories, property, plant and equipment, payroll, and other current liabilities is included. The course covers the various forms of ownership including sole proprietorships, partnerships, and corporations.

ACCT 262 Principles of Accounting II

3 semester credits

This course completes the introduction to financial accounting by covering long-term investments and liabilities. Students learn to prepare and understand a statement of cash flows and perform financial statement analysis. The course then turns its focus to managerial accounting: Cost analysis and decision making, job costing, process costing, capital budgeting, cost-volume-profit analysis, and variance analysis. Prerequisite: ACCT 261.

ACCT 265 Income Tax

3 semester credits

This class examines the federal income tax system as it applies to individuals, partnerships, and corporations. Topics include gross income, adjustments to income deductions, tax credits and exemptions. Prerequisite: ACCT 262.

ACCT 270 Accounting for Non-Profit Organizations

3 semester credits

Accounting for Non-Profit Organizations is an introductory course in school accounting systems. The course is outlined after the model presented in the Montana School Accounting Manual published by the Office of Public Instruction. The course will note the differences in accounting systems as learned in the ACCT 261 and ACCT 262 Accounting Principles courses and those systems used for school accounting.

ACCT 285 Accounting Systems

3 semester credits

This course presents qualities in manual and computer accounting systems. Students will learn how to establish a system to give them more detailed information for decision making. Internal controls to safeguard both assets and records will be emphasized. Prerequisite: ACCT 261.

ACCT 315 Intermediate Accounting I

3 semester credits

The class emphasizes accounting principles and theory as they relate to the balance sheet and income statement. This course is primarily concerned with the conceptual basis of accounting, current and non-current assets, liabilities including lease obligations, and deferred taxes. Prerequisite: ACCT 262.

ACCT 316 Intermediate Accounting II

3 semester credits

This class completes the financial accounting sequence. It focuses on problem areas including pension obligations, various equity instruments, accounting for inflation, earnings per share, and Statement of Cash Flows. Prerequisite: ACCT 315.

ACCT 321 Managerial Accounting

3 semester credits

This course emphasizes the use of accounting information in managerial decision making. Content includes cost-volume-profit analysis, budget preparation, analysis of variances, relevant costs, and pricing decisions. Prerequisite: ACCT 262.

ACCT 322 Auditing

3 semester credits

This course includes details of the accounting function used in the managerial and production functions. Content includes job costing in manufacturing and services, process costing, cost allocation, capital budgeting, and control systems. Prerequisite: ACCT 321.

ACCT 407 Financial Statement Analysis

3 semester credits

Financial Statement Analysis trains the participant to thoroughly understand the financial statements of a business. It is useful for indicating problems a business may have while there is still time to take corrective action. Students learn that lenders and investors analyze a financial statement from a different perspective than management. It is, therefore, very useful for students planning to enter banking, accounting, management, or investing careers. Specific elements of the course include ratio analysis, understanding "window dressing", or the deliberate attempts by a company to glorify its financial statements, Dupont analysis, industry analysis, and forecasting bankruptcy. Prerequisite: ACCT 262.

AGRICULTURE



AG 100 Leadership Development

2 semester credits

Students will learn how to be more effective as a member, officer and leader in meetings and groups. Emphasis will be placed on developing parliamentary procedure skills for effectively conducting meetings. Leadership skill development, characteristics of leaders, and ways to become a more effective leader will be explored. Active participation in a campus club or organization is required for those enrolled in this class.



AG 101 Animal Science

3 semester credits

A general introductory class on animal agriculture dealing with livestock terminology, breeds, beef, sheep, swine, poultry, horses, and dairy animals. Livestock marketing, market classes and grades, and the industry as a whole will be covered.



AG 102 Plant Science

3 semester credits

A general introductory class covering basic plant structure, physiology, reproduction, ecology, geography and evolution. Emphasis will be on crops relating to Montana agriculture.



AG 105 Agricultural Marketing and Economics

3 semester credits

Principles of economics and agricultural marketing functions, agencies, services, and economic problems associated with production agriculture in Montana. The course includes an overview of commodity trading and the futures market.

AG 125 Farm Management

3 semester credits

Agricultural development and advancement; managerial balance of land, labor, capital, and implementation to provide for greatest returns; also includes farm business organization and arrangements, estate planning, credit, and farm business analysis.

AG 150 Agricultural Computing

3 semester credits

A class designed to acquaint students with agricultural computer applications. Emphasis is placed on software useful to the farmer, rancher and agri-businesses. Instructional computers will be IBM or compatibles that utilize the MS-DOS operating system. Prerequisite: CIS 110.

AG 204 Soils

4 semester credits

An examination of soil as a natural resource. Course topics include soil properties, soil classification, soil water, soil organisms, soil nutrients, and soil formation. Emphasis is placed on soil conservation and the proper management of our soil resources. Prerequisite: AG 102 or BIOL 221.

AG 218 Crop Production

4 semester credits

Art and science of crop production; growth, development, and management of various agricultural field crops; emphasis given to crops important to the Northern Great Plains. Includes yield estimation, storage and handling facilities, tillage and harvesting methods, and practical applications in grading grains. Prerequisite: AG 102. **Course Fee: \$3.00**

AG 230 Agricultural Pest Management

4 semester credits

This is a study of pest management for common Montana agriculture crops. Chemical and non-chemical controls will be discussed. Topics will include pest identification, biology

and control; chemicals, safety and application. There will be an opportunity to qualify for private and commercial pesticide applicator certification as required by the state of Montana.

AG 244 Livestock Feeding

4 semester credits

Principles of animal nutrition and practical feeding of livestock; comprehensive information concerning the composition, properties, and uses of feeds; application of balanced rations incorporating the use of Substitution, Pearson Square, and Computerized ration formulation for private and commercial use. **Course Fee: \$3.00**

AG 245 Livestock Production

4 semester credits

A course that correlates and applies the art and science of production of the four-footed meat animals - beef, sheep, and swine. Topics include breeding and selection, reproduction and physiology, disease, sanitation and pollution control, housing and confinement production, and marketing and processing. Prerequisite: AG 101 or consent of instructor.

AG 254 Forage and Range Management

4 semester credits

A study of the ecology and physiology of forage and range plants. Response of vegetation to grazing, climate and other environmental forces are explored. Range utilization, plant identification and stocking rate exercises are components of this class. Both range and pasture crops are discussed. Prerequisite: AG 102 or BIOL 221.

AG 279 Cooperative Education

1, 3, 6 or 12 semester credits

A planned and supervised work-learning experience in industry, business, government, or community service agencies related to the University program of study. Prerequisites: Two semesters of attendance at Montana State University-Northern, approval of advisor, Chair/Dean of the College of Technical Sciences, and cooperative education coordinator. Pass/Fail only.

AG 305 AG Commodity Marketing

3 semester credits

An examination of marketing tools available to farmers and ranchers, including futures and options. The course addresses costs of production, storage and transportation, risk management, financial planning, and means of securing market information. Prerequisite: AG 105 or AG 150.

AG 350 AG Computer Management

3 semester credits

A course designed to allow students to further develop agricultural computing skills in the areas of AG financial management, AG production, and agricultural accounting. Students will become familiar with various software packages related to enterprise accounting and analysis and financial management. Prerequisites: AG 150 or CIS 118 and ACCT 261.

AG 440 Trends and Issues in Agriculture

3 semester credits

An examination of past and contemporary agricultural issues as they affect the producer, agribusiness, and the consumer.

AG 479 Cooperative Education

1, 3, 6 or 12 semester credits

A planned and supervised work-learning experience extending the student's learning experience in agricultural business, agricultural production, or government agencies related to agriculture. Prerequisites: Junior standing and approval of minor advisor, Chair/Dean of the College of Technical Sciences, and cooperative education coordinator. Pass/Fail only

AGRICULTURAL MECHANICS



AGMT 110 Introduction to Agricultural Machines & Equipment

2 semester credits

This course is an introduction to agricultural machines and equipment. Agricultural machine uses, terminology, components, efficiencies, characteristics, and maintenance will be studied. Topics relating to safety, power transfer principles (gears, belts, chains, and fluid drives), field operations, hitching, operator manuals, trends in machinery, and basic machinery management will be examined.



AGMT 114 Small Engines and RVs

3 semester credits

Basic theory and principles of two and four stroke engines. Service, repair, and reconditioning of small bore engines. Units include mechanical, lubrication, electrical, cooling, and recreation vehicle applications. Lab work includes engine overhaul and troubleshooting. **Course Fee: \$15.00**

AGMT 120 Forage Implements

3 semester credits

Introduction to maintenance, repair, and adjustment of balers, swathers, rakes, and other forage harvesting equipment.

AGMT 130 Introduction to Agricultural Tractors

3 semester credits

Introduction of AG tractors covering sizes, types, efficiencies, preventative and minor maintenance of tractor components and applications of AG tractors. **Course Fee: \$10.00**

AGMT 205 Introduction of Grain Harvesting Equipment

3 semester credits

Introduction to theory, preventative maintenance, repair, and adjustment of conventional and rotary combines.

AGMT 210 Tillage and Planting Implements

2 semester credits

Repair, maintenance, and adjustments of primary and secondary tillage equipment; calibration and repair of grain drills, spray, and fertilizer equipment. Prerequisite: AGMT 110.

AGMT 279 Cooperative Education

1, 3, 6 or 12 semester credits

A planned and supervised work-learning experience in industry, business, government, or community service agencies related to the University program of study.

Prerequisites: Two semesters of attendance at Montana State University-Northern, approval of advisor, Chair/Dean of the College of Technical Sciences, and cooperative education coordinator. Pass/Fail only.

AGMT 350 AG-Tractor and Equipment Applied Technology

4 semester credits

This is an applied technology course designed to measure tractors and equipment efficiencies, which will include: Ballasting, weight ratios, fuel consumption and PTO horsepower. Prerequisites: DIES 262 and 272. **Course Fee: \$15.00**

AGMT 370 Advanced Grain Harvesting Equipment

4 semester credits

This is an advanced combine class designed to cover the following: diagnosis and repair of hydraulic and electronic components; a study of the application of hydraulics and electronic components; diagnosis and repair of major internal combine components. Prerequisites: AGMT 205, DIES 114, and DIES 214. **Course Fee: \$15.00**

AGMT 410 Agricultural Machinery Management

3 semester credits

This course is designed to evaluate equipment from a management perspective. Topics will cover machinery maintenance, leasing and purchasing equipment, depreciation, new and used equipment management factors, machine cost analysis, machinery specifications for selected applications and the factors involved in machinery operation.

AGMT 479 Cooperative Education

1, 3, 6 or 12 semester credits

A planned and supervised work-learning experience extending the student's learning experience in industry, business, government, or community service agencies related to the University program of study. Prerequisites:

Cooperative Education 279 or Junior standing and approval of advisor, Chair/Dean of the College of Technical Sciences, and cooperative education coordinator. Pass/Fail only.

AGRICULTURAL OPERATIONS TECHNOLOGY

AOT 301 Global Positioning Systems

2 semester credits

This course will allow students to acquire an understanding of global positioning systems (GPS) technology and how it is used in agriculture, outdoor activities, orienteering, and in managing land resources. Class participants will use handheld and mapping grade GPS receivers and become familiar with GPS data collection, differential correction, processing of spatial data, map types, coordinate grinds, map datum, and waypoints. Students will learn how to link GPS receivers with computers and machinery, manage GPS data with software, upload and download coordinate information and create printouts of spatial data, locations and routes.

ART

ART 100 Introduction to Art

3 semester credits

A slide-lecture survey of the visual arts and architecture. Analytical study of specific works and techniques, and consideration of broad contexts and principles. **Course Fee: \$10.00**

ART 101 Studio Foundation

3 semester credits

Introduction to studio process and concepts of two and three dimensional media processes. **Course Fee: \$15.00**

ART 115 Ceramics

3 semester credits

Elementary studio practice involving hand building and wheel techniques of forming functional and nonfunctional stoneware. **Course Fee: \$20.00**



ART 120 Drawing I

3 semester credits

Study and supervised practice in observational drawing focusing on accurate representation of observed subject matter.



ART 150 Two-Dimensional Design I

3 semester credits

A lecture/studio course in investigating basic design elements: line, shape, texture, and value. The elements considered in the context of compositional principles.

Course Fee: \$15.00

ART 151 Two-Dimensional Design II

3 semester credits

A lecture/studio course investigating the elements of color: hue, value, and intensity. Color harmony and contrasts studied in compositional context.

ART 204 Printmaking

3 semester credits

An introduction to the fundamental graphic techniques of relief and intaglio printmaking including: woodcut, linocut, dry point, etching, and collograph. **Course Fee: \$10.00**

ART 220 Drawing II

3 semester credits

Studio exercise in observational and imaginative drawing including rendering of the human figure. A variety of expressive techniques and media will be explored.

Prerequisite: ART 120.

ART 254 Painting I

3 semester credits

A beginning studio course in still life painting in oil or acrylic. Drawing, color, and design emphasized. Prerequisite: Art 120.

ART 256 Watercolor Painting I

3 semester credits

A beginning studio course in watercolor painting. Research of the medium and observed material toward appropriate use of the transparent medium. Prerequisite: ART 120.

ART/METL 353 Metal Sculpture

3 semester credits

Metal sculpture is a lecture/studio course which is team taught by art and welding faculty. The course examines all phases of the creative process from concept to criticism of the finished form. Both abstract and representational sculpture will be examined with emphasis on welding fabrication.

Course Fee: \$20.00

ART 355 Painting II

3 semester credits

Development of individual technique and expression in chosen painting medium/media. The student will continue to work with the painting medium taken as prerequisite for this course. Emphasis will be on composition as a means of expression. Prerequisite: ART 254 or ART 256.

ART 361 Art History of Western Civilization I

3 semester credits

A survey of the development of the visual arts of the Western World from Prehistoric through Gothic Art.

ART 362 Art History of Western Civilization II

3 semester credits

A survey of the development of the visual arts of the Western World from the Renaissance through Post-Modernism.

AUTOMOTIVE/DIESEL



ATDI 134 Auto/Diesel Electrical/Electronic Systems I

4 semester credits

A beginning course in the study of electrical/electronic fundamentals applied to automotive and commercial vehicle systems. Includes theory, design, diagnosis, and repair of wiring and circuits, batteries, alternators, and starters. The use of test instruments and electrical troubleshooting manuals currently recommended by industry will be emphasized.

Course Fee: \$17.00

ATDI 257 Automatics

4 semester credits

A course in automatic transmissions including lecture, demonstration, and student participation in disassembling and reassembling of selected transmissions for the purpose of understanding the function, construction, operation, servicing, and troubleshooting procedures. Prerequisite:

AUTO 117 or DIES 216. **Course Fee: \$20.00**

ATDI 264 Auto/Diesel Electrical/Electronic Systems II

4 semester credits

This course is a continuation of the study of electrical/electronic systems in use on current automotive and commercial vehicles. With emphasis on industry recommended diagnostic and repair procedures, topics include charging and cranking systems, ignition systems, power accessories, and an introduction to microprocessor-based engine, power trains, and brake/suspension control systems. Prerequisite: ATDI 134.

ATDI 265 Heating and Air Conditioning

4 semester credits

Theory of heating and basic air conditioning equipment in automotive, heavy truck, and farm applications; servicing and repairing of these units. Prerequisite: ATDI 134. **Course Fee: \$20.00**

ATDI 383 Alternative Automotive Power Systems

3 semester credits

This course examines a variety of alternative power sources used in the automotive transportation industry. Topics covered in the class are compression ignition engine systems, propane & CNG systems, hybrid electric systems, and electric propulsion systems. Prerequisites: ATDI 134 and ATDI 264.

ATDI 384 Auto/Diesel Electrical/Electronic Systems III

4 semester credits

This course provides an in-depth study of microprocessor-based vehicle control systems, diagnostic systems, and development/testing systems. Students will experience oral and written reporting on current applications. Topics include multiplexed communications, bi-directional scanners, data structures and PC-based service bay systems, and test cells. Prerequisite: ATDI 134 and ATDI 264. **Course Fee: \$17.00**

ATDI 400 Shop Procedures

2 semester credits

The student will deal with training procedures, including establishing preventative maintenance programs, cost per hour operations and investment analysis. Selected computer programs will also be used. This is a course that deals with:
1. The organization of a shop
2. Service procedure
3. Shop layout and organization for diesel, automotive and auto body shops to give the best advantage to management, employees and customers.

AUTOMOTIVE

AUTO 105 Consumer Mechanics

2 semester credits

An awareness course for the passenger car owner-operator. A study of the operation and minor maintenance and repair techniques used in service stations and garages. Also a study of the cost of repair, purchasing, financing, and insuring an automobile. **Course Fee: \$4.00**

AUTO 115 Introduction to Automotive Service

1 semester credit

An introductory course designed to assist the novice automotive technician in adjusting to the demands of an automotive service facility. This course will expose the student to the flat rate method of shop pay as well as focus on many customer concerns. The student will experience the most effective method when dealing with customer service while demonstrating correct dealer etiquette.

AUTO 117 Automotive Manual Power Trains

4 semester credits

This course examines automotive manual power trains. It includes the construction, maintenance, diagnosis, and repair of manual transmissions and transaxles, transfer cases, rear axles, drive shafts, and clutches. Driveline angles and Noise, Vibration & Harshness (NVH) will be discussed. Lab application of service procedures is included.

AUTO 119 Automotive Braking Systems

4 semester credits

This course examines automotive braking systems, including hydraulic and friction theory. The construction, maintenance, diagnosis, and repair of disc, drum and antilock braking systems are studied. Use of off-the-car and on-the-car-brake lathes are included in lab. Lab application of service procedures is included.



AUTO 128 Engines

4 semester credits

Overview of the design, operation, diagnosis, and service procedures of modern automotive engines. Students participate in the disassembly and the reassembly of engine units. Service and technical engine data are presented to prepare the students for practical experience in engine servicing. **Course Fee: \$20.00**

AUTO 151 Diagnosis and Tune Up

3 semester credits

A theory course pertaining to fuel systems, emission control systems, ignition systems, engine mechanical tests, and General Motors Computer Command Control. Proper testing with modern diagnosis equipment will also be discussed. Must be taken with AUTO 152 Lab.

AUTO 152 Diagnosis and Tune Up Lab

3 semester credits

A lab course pertaining to diagnosis, testing, and repair of fuel systems, emission control systems, ignition systems, engine mechanical tests, and General Motors Computer Command Control. Provides training on the proper use of modern diagnosis equipment. Must be taken with AUTO 151.

AUTO 220 Automotive Steering and Suspension

4 semester credits

This course examines automotive suspension and steering systems. The theory of operation, construction, maintenance, diagnosis, and repair of steering and suspension systems is examined. Alignment procedures, wheel balancing, steering, suspension, headlight aiming, and structural damage diagnosis will be discussed. Lab application of service procedures is included.

AUTO 251 Computerized Engine Control Systems

3 semester credits

Computerized fuel injection and carburetor systems will be covered. Theory of operating and testing General Motors, Ford, Chrysler, Toyota, and Bosch computerized systems will be discussed. Must be taken with AUTO 252 Lab.

Prerequisite: AUTO 128, AUTO 151, and ATDI 134.

AUTO 252 Computerized Engine Control Systems Lab

3 semester credits

A practical course dealing with the diagnosis and repair of computerized engine control systems. A student will obtain the necessary hands on training required to use the specialized test equipment to diagnose and repair domestic and foreign systems. Must be taken with AUTO 251. **Course Fee: \$10.00**

AUTO 255 Applied Service Technology

3 semester credits

A practical course dealing with the removal and installation of engines and automatic transmissions on both front and rear wheel drive vehicles. Some live work may be performed regarding tune-up, brakes, electrical, power trains and chassis systems. Prerequisite: ATDI 134, AUTO 117, AUTO 119, AUTO 128, AUTO 151, and AUTO 152.

AUTO 279 Cooperative Education

1, 3, 6 or 12 semester credits

A planned and supervised work-learning experience in industry, business, government, or community service agencies related to the University program of study.

Prerequisites: Two semesters of attendance at Montana State University-Northern, approval of advisor, Chair/Dean of the College of Technical Sciences, and cooperative education coordinator. Pass/Fail only.

AUTO 355 Automotive Service Operations

3 semester credits

A practical course dealing with the removal and installation of engines on front and rear wheel drive vehicles. Students will also gain experience in shop management by figuring efficiency, productivity, estimating, pay scales, and quality control. Prerequisite: Junior standing, ATDI 134, ATDI 264, AUTO 128, AUTO 151, AUTO 152, AUTO 251, and AUTO 252.

AUTO 408 Current Trends in Mobility Technology

2 semester credits

This course presents an examination of current model year design and trends in the mobility industries. Extensive undergraduate research and the latest techniques for presenting material will be employed.

AUTO 450 Dynamometer Testing and Computer System Data Analysis

4 semester credits

Dynamic testing, analysis and evaluation of internal combustion engines from both, the mechanical and computer system application. Prerequisites: AUTO 251, AUTO 252, ATDI 384, ENGL 112 (can be taken concurrently), SPCH 141, and Senior Standing.

AUTO 457 Advanced Power Trains

4 semester credits

This course examines advanced component operation and diagnosis in automotive power trains. Topics covered in the class are automatic transmissions, automatic transaxles, all wheel drive systems, CVT (constant variable transmissions), power train electronic control systems and NVH (noise, vibration & harshness) diagnosis. Prerequisite: AUTO 117 and ATDI 257.

AUTO 479 Cooperative Education

1, 3, 6 or 12 semester credits

A planned and supervised work-learning experience in industry, business, government, or community service agencies related to the University program of study.

Prerequisites: Cooperative Education 279 or Junior standing and approval of advisor, Chair/Dean of the College of Technical Sciences, and cooperative education coordinator. Pass/Fail only.

AUTO 488 Automotive Practicum

3 semester credits

Individualized research practicum selected by the student and an automotive instructor. Survey of literature available, testing and evaluation of project with an oral defense of the resulting paper. Prerequisites: ENGL 112, SPCH 141, all required AUTO courses, and Senior Standing.

BIOLOGY

BIOL 110 Introduction to Environmental Health

3 semester credits

An orientation to the field of environmental health and human interactions with the environment, including a survey of topics of environmental protection, food and water, waste water processes, solid waste disposal, living and working environments, epidemiology of environmentally associated diseases, and pollution control policy. Current federal and state regulations are reviewed.



BIOL 140 Cell Biology

4 semester credits

The structure and function of plant and animal cells, including respiration, photosynthesis, reproduction, genetics, and protein synthesis. Other topics considered are tissues, embryology, and unicellular organisms. Concurrent enrollment in BIOL 141 Lab is required.



BIOL 141 Cell Biology Laboratory

1 semester credit

Laboratory studies in cell structure and function, respiration, photosynthesis, reproduction, genetics, tissues, embryology, and unicellular organisms. Must be taken concurrently with BIOL 140. **Course Fee: \$12.00**

BIOL 151 Essentials of Biology

4 semester credits

An introduction to biology, including chemical principles, cell structure and function, classification and characteristics of bacteria, protists, fungi, plants, and animals, and such ecological concepts as ecosystems, energy relationships,

cycles, succession, and populations. Includes lecture and laboratory hours. **Course Fee: \$10.00**



BIOL 204 Essentials of Anatomy and Physiology

4 semester credits

An introduction to the organ systems of the human body, including chemical principles, cell and tissue study, and the organ systems: muscular, skeletal, integumentary, digestive, circulatory, immune, respiratory, excretory, nervous, muscular, skeletal, endocrine, and reproductive. Includes lecture and laboratory hours. **Course Fee: \$8.00**

BIOL 217 Microbiology

4 semester credits

A survey of the microbial world including bacteria, viruses, protozoa, algae and fungi, relationships of microorganisms to man and to the environment including health and disease, cultivation, isolation, microbial metabolism and genetics, with emphasis on antisepsis and medical microbiology for students entering health related fields as well as applied microbiology related to water quality. Appropriate for students in general education and science and health related programs. Includes lecture and laboratory hours.

Recommended: high school biology or BIOL 140. **Course Fee: \$20.00**

BIOL 221 Botany I

3 semester credits

Introduction to the plant kingdom that primarily focuses upon the cytology, anatomy, morphology, and general physiology of the flowering plants. Concurrent enrollment in BIOL 222 is required. Prerequisite: Basic college biology course.

BIOL 222 Botany I Laboratory

2 semester credits

Laboratory activities that primarily focus upon the cytology, anatomy, morphology, taxonomy of the flowering plants.

Concurrent enrollment in BIOL 221 is required. **Course Fee: \$5.00**

BIOL 241 Anatomy and Physiology I

4 semester credits

An introduction to the form and function of the parts of the human body, with studies on the tissues, bones, muscles, respiration, and circulation. Includes lecture and laboratory hours. Prerequisite: High School Biology or BIOL 140 are strongly recommended. Placement exam will be administered. **Course Fee: \$13.00**

BIOL 242 Anatomy and Physiology II

4 semester credits

Emphasis on the regulations of the energy supply and the internal environment. Units covered are nerves, endocrines, digestion, cell metabolism, excretion, and reproduction.

Includes lecture and laboratory hours. Prerequisites: BIOL 241; or BIOL 140 and CHEM 111 or equivalent. **Course Fee: \$13.00**

BIOL 250 Undergraduate Research

3 semester credits

Opportunity to perform undergraduate research under the counsel and guidance of departmental staff. Students will summarize research results in scientific papers and oral presentations. Prerequisite: consent of instructor.

BIOL 279 Cooperative Education

1, 3, 6 or 12 semester credits

A planned and supervised work-learning experience in industry, business, government, or community service agencies related to the University program of study.

Prerequisites: Two semesters of attendance at Montana State University-Northern, approval of advisor, Chair/Dean of the College of Arts and Sciences, and cooperative education coordinator. Includes lecture and laboratory hours. Pass/Fail only.

BIOL 314 General Ecology

4 semester credits

Integrated principles of ecology with special emphasis on terrestrial ecosystems. Some attention directed to selected ecological methods and statistical evaluations via laboratory activities. Offered alternate years. Prerequisites: BIOL 140 or BIOL 151 or BIOL 221.

BIOL 322 Botany II

4 semester credits

A general survey of the plant kingdom and plant classification with special emphasis on bryophytes, and the non-flowering tracheophytes and their reproductive processes, together with an introduction to algae and the fungi. Offered alternate years. Prerequisite: Basic college biology course.

BIOL 324 Entomology

3 semester credits

An introduction to the anatomy, characteristics and classification of insects including methods of collecting, preserving, identifying, and displaying insects. Preparation of an insect collection is required. Offered alternate years.

Prerequisite: BIOL 348 or consent of instructor. **Course Fee: \$9.00**

BIOL 334 Ornithology

3 semester credits

The biology of birds, including their morphology, physiology, behavior, ecology, and classification. Emphasis on the recognition of Montana species, developed through the use of photos, preserved skins, and local field trips. Offered alternate years. Prerequisite: BIOL 348 or consent of instructor. **Course Fee: \$5.00**

BIOL 348 Zoology

3 semester credits

A survey of invertebrate and vertebrate animal phyla including classification, morphology, physiology, characteristics, and natural history. Concurrent enrollment in BIOL 350 required. Prerequisite: BIOL 140 or equivalent.

BIOL 350 Zoology Laboratory

2 semester credits

The laboratory component of BIOL 348. Microscopic and macroscopic studies of animals. Dissection of squid, earthworms, crayfish, sea stars, dogfish sharks, frogs, fetal

pigs, and others. Concurrent enrollment in BIOL 348 required. **Course Fee: \$13.00**

BIOL 363 Lentic Ecology

3 semester credits

Structure and function of standing-water aquatic systems with emphasis on the ponds and lakes of mountain and prairie locales. Offered alternate years. Prerequisite: BIOL 140 or BIOL 151 or equivalent.

BIOL 364 Stream Ecology

3 semester credits

Structure and function of flowing-water aquatic systems with emphasis on the creeks and rivers of mountain and prairie locales. Offered alternate years. Prerequisite: BIOL 140 or BIOL 151 or equivalent.

BIOL 406 Molecular Biology Techniques

3 semester credits

Introduction to such techniques of molecular biology as electrophoresis and chromatography as these methodologies are employed in the fields of cytology, molecular genetics, and physiology. Graduate credit requirements are described in the course syllabus.

BIOL 407 Freshwater Biology

3 semester credits

The focus of the course will be directed towards examination, identification, and classification of a wide variety of freshwater organisms abundant in Montana's aquatic systems. Extensive laboratory work and field trips are required. Graduate credit requirements are described in the syllabus. Prerequisites: basic biology course.

BIOL 408 Flowering Plants of the Plains and Mountains

3 semester credits

Study of flowering plants found in prairie, foothill, mountain, riparian, and aquatic habitats. Methods of collection, general identification, and preservation of a series of plant specimens, including development of a herbarium, are included. Graduate credit requirements are described in the syllabus.

BIOL 415 Ecological Methods

3 semester credits

Study of methodologies used by ecologists to examine the environment. Laboratory and field procedures are stressed, together with review of associated ecological concepts. Graduate credit requirements are described in the syllabus. Prerequisite: Basic ecology course.

BIOL 425 Methods of Teaching Secondary Science

2 semester credits

Practical and hands-on approach to illustrating the techniques and materials for teaching at the secondary level in the physical and biological sciences. Offered alternate years. Prerequisite: Junior standing.

BIOL 455 Phycology

3 semester credits

Modern study of algae with special emphasis on systematic, ecology, reproductive processes, morphology, and evolutionary relationships.

BIOL 460 Advanced Microbiology

3 semester credits

Review of the microbial world involving bacteria and viruses and their impact on human immune function, disease prevention, environmental and industrial applications, and microbial ecology. Designed for students interested in continuing in science, particularly in pharmacy and pre-med. Prerequisite: BIOL 140 and BIOL 217.

BIOL 468 Molecular Biology and Genetics

4 semester credits

Structure and function of cells emphasizing molecular aspects at cellular, organelle, and physiological levels. Molecular composition of cell organelles, structure of eukaryotic genomes including chromosomes, recombination, gene structure and transcription, gene control during development, hormonal influence on gene expression, chemical synthesis, and factors influencing inheritance patterns. Emphasis is on animal cells. Includes lecture and laboratory hours. Prerequisite: BIOL 140 or equivalent; one semester of college chemistry.

BIOL 479 Cooperative Education

1, 3, 6 or 12 credits

A planned and supervised work-learning experience in industry, business, government, or community service agencies related to the University program of study. Prerequisites: Cooperative Education 279 or Junior standing and approval of advisor, Chair/Dean of the College of Arts and Sciences, and cooperative education coordinator. Pass/Fail only.

BIOL 506 Molecular Biology Techniques

3 semester credits

Introduction to such techniques of molecular biology as electrophoresis and chromatography as these methodologies are employed in the fields of cytology, molecular genetics, and physiology. Graduate credit requirements are described in the course syllabus.

BIOL 507 Freshwater Biology

3 semester credits

Examination, identification, and classification of a wide variety of freshwater organisms abundant in Montana's aquatic systems. Extensive laboratory work and field trips are required. Graduate credit requirements are described in the syllabus. Prerequisites: basic biology course.

BIOL 508 Flowering Plants of the Plains and Mountains

3 semester credits

Study of flowering plants found in prairie, foothill, mountain, riparian, and aquatic habitats. Methods of collection, general identification, and preservation of a series of plant specimens, including development of a herbarium, are included. Graduate credit requirements are described in the syllabus.

BIOL 515 Ecological Methods

3 semester credits

Review of the various methodologies that are used by ecologists to examine the environment. Stresses laboratory and field procedures that are applicable to a classroom situation. They will be presented in conjunction with a review of the associated ecological concepts. Graduate credit requirements are described in the course syllabus.

Prerequisite: Basic ecology course.

BIOL 568 Molecular Biology and Genetics

4 semester credits

Structure and function of cells emphasizing molecular aspects at cellular, organelle, and physiological levels. Molecular composition of cell organelles, structure of eukaryotic genomes including chromosomes, recombination, gene structure and transcription, gene control during development, hormonal influence on gene expression, and chemical synthesis. Factors influencing the inheritance patterns. Emphasis on animal cells. Includes lecture and laboratory hours. Graduate credit requirements are described in the course syllabus. Prerequisite: BIOL 140 and equivalent college chemistry.

BIOL 635 Advanced Zoology

3 semester credits

Characteristics, classification, identification, life history, and ecological distribution of North American mammals and freshwater fish. Laboratory hours are devoted largely to the recognition and identification of representative species.

Prerequisite: Vertebrate Zoology course.

BODY

BODY 140 Panel Adjustment and Glass

2 semester credits

By the end of the class the students will understand the box theory of automobile design and current trends in construction. They will be able to adjust door, hood, fender and bumper, properly install doors and windshields to factory specification. Shop safety is emphasized.

BODY 141 Introduction to Metal Refinishing

3 semester credits

The students will be in a classroom setting where they will learn the principles of auto body repair and safe personal and tool practices. They will be able to identify the types of dents and proper sequences for dent removal. They will also be able to identify three types of primer and the proper use and properties of each. Safety is emphasized.

BODY 142 Metal Repair Lab

3 semester credits

Students will learn shop safety, proper safe painting and priming techniques, and three methods of dent removal. By the end of the semester they will have repaired a prescribed dent in five minutes and painted a body part on a vehicle, door, fender, hood, etc. They will learn proper sanding and painting using three different materials used by the industry today and the safe handling of each one. **Course Fee: \$20.00**

BODY 143 Refinishing

3 semester credits

The students will continue skills learned in BODY 141 Introduction to Metal Refinishing, and be able to remove dents and complete repairs to a vehicle including complete refinishing. They will use fresh air supplied paint suits and safely use and dispose of excess products.

BODY 144 Refinishing Lab

3 semester credits

The students will paint a minimum of one car and spot repair six cars to match original finish. They will also learn the skill of proper sanding and feathering so the repaired area cannot be determined. **Course Fee: \$20.00**

BODY 215 Principles of Unibody Repair

Fundamentals

3 semester credits

The students will be able to read and understand frame specification books. They will also understand the structural design of unibody and the characteristics of the metal used in auto construction.

BODY 216 Unibody Repair Technology

3 semester credits

The students will straighten one independent frame, one unibody, and remove and replace a transaxle engine. They will also measure additional cars beside the ones they repair. They will correctly complete three types of MIG weld used in auto body repair process using proper safety equipment as the job requires. **Course Fee: \$20.00**

BODY 241 Estimating

4 semester credits

The students learn the proper use of industry estimating guide. By the completion of the course they will understand how to write an estimate in good form as accepted by the insurance industry and have good skills in estimating areas to be repaired.

BODY 243 Shop Production

3 semester credits

The students will learn to identify plastics used in current automotive manufacturers and how to repair them correctly. They will also learn the steps in door repair panels and quarter panel replacement. They will also learn acceptable shop procedures by keeping track of time and materials spent on live work plus safety shop practices.

BODY 244 Shop Production Lab

3 semester credits

The students will work on live projects completing required projects in one and one half times the estimate. They will learn how to weld on doors and quarter panels as well as keep track of materials and the time spent on each job. **Course Fee: \$20.00**

BODY 279 Cooperative Education

1, 3, 6 or 12 semester credits

A planned and supervised work-learning experience in industry, business, government, or community service agencies related to the University program of study. Prerequisites: Three semesters of attendance at MSU-

Northern, approval of advisor, Chair/Dean of the College of Technical Sciences, and cooperative education coordinator. Pass/Fail only.

BODY 354 Auto Body Shop Management Lab

3 semester credits

The students will manage the shop as a shop foreman would do, scheduling and writing estimates as well as keeping track of the BODY 243 Shop Production students' material and time cards. **Course Fee: \$5.00**

BUSINESS EDUCATION



BUED 100 Keyboarding

2 semester credits

For beginners in keyboarding. Emphasis will be on developing proper techniques for keying alphabetic and number keys and applying this skill in the production of simple business correspondence. This course is designed for students with no prior instruction/experience in keyboarding. This course will not be required for Business Education students who successfully pass the BUED 142 pretest.

BUED 110 Introduction to Business Education

1 semester credit

Provides the prospective educator with an overview of the field of education in general and business education, in particular. The process of becoming a certified teacher will be discussed, as well as requirements and expectations of business education students. Note-taking skills will be addressed and OPI/NCATE and National Standards will be covered. Additionally, the teaching portfolio and teaching journal and resources will be addressed.



BUED 142 Introduction to Word Processing

2 semester credits

A class on word processing concepts, terminology and machine manipulation. Prerequisite: 30 Net WPM on Pretest or Consent of Instructor.

BUED 230 Office Skills

2 semester credits

Application of procedures in the modern office including office communications technology, filing systems, organizational skills, time management, and professional conduct. The course will also cover a number of clerical operations including calculators, Dictaphones/transcription, telephone skills, and reprographics. Prerequisite: BUED 142 or instructor consent.

BUED 238 Automated Office

3 semester credits

Tasks, activities, and conditions found in a modern business office. Students will use an integrated computer simulation to perform a variety of office tasks. Prerequisites: BUED 142 and BUED 230.

BUED 245 Personal Finance

3 semester credits

Provides the student with the tools to make them better financial consumers. Class will examine the techniques of budgeting, investing, using credit, and purchasing capital goods. Additionally, students will be provided with the option of investigating retirement programs and estate planning as well as tax preparation. A number of projects are required to help students apply information from the class to their own real-life situation.

BUED 279 Cooperative Education

1, 3, 6 or 12 semester credits

A planned and supervised work-learning experience in industry, business, government or community service agencies related to the University program of study. Prerequisites: Two semesters of attendance at MSU-Northern, approval of advisor, Chair/Dean of the College of Technical Sciences, and cooperative education coordinator. Pass/Fail only.

BUED 280 The Internet, Web Page Design, and On-line Course Supplements for Educators

2 semester credits

Students will learn to use effective search strategies with a variety of browsers. Students will learn to design web pages, both personal and course-related, and will begin preparing on-line supplements for the courses typically taught in the high schools (these web pages will be completed during the methods courses). Prerequisite: CIS 111.

BUED 302 Introduction to E-Commerce and Internet Marketing

3 semester credits

Students will develop an Internet marketing plan and subsequent Internet marketing tools. Students will conduct market research, photograph products, layout pages, develop customer service strategies, and perform the technical aspects of web catalog production. Prerequisite: BUED 280 or consent of instructor.

BUED 305 Video Editing and Production

3 semester credits

This course will provide students with a basic foundation in the concepts of video production and editing. Students will tap into their higher level thinking skills by translating an idea into effective video utilizing digital hardware and computer editing software. They will also learn the use of video technology to bridge the printed word with visuals. A number of projects will be required including techniques of creating school news broadcasts, video resumes, video yearbooks and the use of video technology in marketing and promotion. Students will also research equipment that would be needed to equip a school television studio.

BUED 315, 316, 317, 318, & 319

Each methods course will emphasize the special methods and materials necessary to teach the associated course in the public schools. Included are techniques for planning, organizing, evaluating, and measuring learner performance. Students will practice selecting, designing, developing and utilizing objectives, and designing learning/teaching

strategies suitable for the course and the audience. Students will develop syllabi, unit plans, and lesson plans, and will present multi-media teaching demonstrations to both peers and Master teachers. Students will complete the development of Internet supplementary material for each subject area begun in BUED 280. Each course will additionally discuss the philosophy and objectives of vocational education and occupational technology as they apply to the specific subject area. Each methods course will require a period of observation of a high school class in the subject area as well as participation in on-line discussions.

BUED 315 Methods of Teaching Accounting

1 semester credit

Prerequisites: Completion of ACCT 261, ACCT 262, and ACCT 285, and Admission to Teacher Education.

BUED 316 Methods of Teaching Keyboarding and Word Processing

1 semester credit

Prerequisites: Completion of BUED 142 and Admission to Teacher Education

BUED 317 Methods of Teaching Office Skills

1 semester credit

Prerequisites: Completion of BUED 230 and Admission to Teacher Education.

BUED 318 Methods of Teaching Personal Finance

1 semester credit

Prerequisites: Completion of BUED 245 and Admission to Teacher Education.

BUED 319 Methods of Teaching Business Law

1 semester credit

Prerequisites: Completion of BUS 271 and Admission to Teacher Education.

BUED 348 Business Communications

3 semester credits

This course presents a comprehensive view of the scope and importance of communications for business, emphasizing the composition of letters and memos typically utilized by business, sales and claims correspondence, and special situation letters. Employment applications and resume writing will be reviewed. Preparation of business reports and proposals, along with oral, multi-media presentations covering a wide range of business situations, is also included. This course meets the University requirements for a "capstone course". Prerequisites: completion of fundamental skills English and speech requirements.

BUED 421, 422, 423, & 424

Each methods course will emphasize the special methods and materials necessary to teach the associated course in the public schools. Included are techniques for planning, organizing, evaluating, and measuring learner performance. Students will practice selecting, designing, developing and utilizing objectives, and designing learning/teaching strategies suitable for the course and the audience. Students will develop syllabi, unit plans, and lesson plans, and will present multi-media teaching demonstrations to both peers

and Master teachers. Students will complete the development of Internet supplementary material for each subject area begun in BUED 280. Each course will additionally discuss the philosophy and objectives of vocational education and occupational technology as they apply to the specific subject area. Each methods course will require a period of observation of a high school class in the subject area as well as participation in on-line discussions.

BUED 421 Methods of Teaching Marketing

1 semester credit

Prerequisites: Completion of BUED 305, BUS 335, and Admission to Teacher Education

BUED 422 Methods of Teaching Entrepreneurship

1 semester credit

Prerequisites: Completion of BUS 300, BUED 302, SBM 416, and Admission to Teacher Education

BUED 423 Methods of Teaching Computer Applications

1 semester credit

Prerequisites: Completion of CIS 111, BUED 280, BUED 348, CIS 320, and Admission to Teacher Education

BUED 424 Methods of Teaching Business to Special Learners

1 semester credit

Students will learn how to adapt the classroom and their teaching methods for the special/exceptional learner. Classroom management skills will also be emphasized.

Prerequisites: All 300 level methods courses and Admission to Teacher Education. This course may be taken concurrently with 400 level methods courses.

BUED 455 Pre-Practicum Seminar

1 semester credit

This course will emphasize the details, student teaching etiquette, the things that students never seem to be told before they embark on their student teaching adventure - areas such as who do you talk to, when do you talk to them, and what do you say. Grading, time management, extra-curricular activities, dress, demeanor, and test writing will be covered. Expect information on student vocational organizations, school-to-work, tech prep, and credit-to-work programs as well. The class is to be taken the semester immediately prior to the student teaching experience. A portion of the class will be held prior to student teaching and the remainder of the class will be taken during and immediately after the student teaching experience.

BUED 479 Cooperative Education

1, 3, 6 or 12 semester credits

A planned and supervised work-learning experience extending the student's learning experience in industry, business, government or community service agencies related to the University program of study. Prerequisites: Cooperative Education 279 or Junior standing and approval of advisor, Chair/Dean of the College of Technical Sciences, and cooperative education coordinator. Pass/Fail only.

BUSINESS



BUS 100 Introduction to Business

3 semester credits

Fundamental concepts of terminology in the business administration field: covers such areas as management, marketing, accounting, production, purchasing, data systems, personnel, and finance with practical application of fundamental principles.

BUS 110 Creative Problem Solving

3 semester credits

The course teaches the application of the basic elements of reasoning to common business scenarios. The student will identify reasoning abilities that are necessary for developing management skills. The student will be introduced to the standards used in evaluating their reasoning and a variety of case studies will be used to apply the concepts of the course.

BUS 120 Leadership and Quality Management

3 semester credits

Leadership for First Line Management. Study of the practices, roles, attributes, challenges, and principles of leadership. The implementation of the qualities of leadership - kindness, justice, self-control, and energy.

BUS 250 Business Statistics

3 semester credits

This course builds on the basic mathematical skills learned in MATH 112 and adapts them for statistical analysis used by business and industry to aid decision making. Topics covered include data gathering, descriptive statistics, probability, inferential statistics, analysis of variance and regression analysis. Autocorrelation analysis, nonparametric statistics, decision making under uncertainty and business forecasting are introduced. Prerequisite: MATH 110 or 112 or consent of instructor.

BUS 271 Legal Environment of Business

3 semester credits

The course serves as both a basic introduction to the legal system and a general overview of specific legal topics. In the introductory phase of the class, students will study the different kinds of law that make up our legal system, the courts, and the steps in a court case. The class will cover traditional legal topics like contract law, property law, torts, and business organizations. Students will also study newer areas of law like sales contracts, product liability law, and consumer protection law.

BUS 279 Cooperative Education

1, 3, 6 or 12 semester credits

A planned and supervised work-learning experience in industry, business, government or community service agencies related to the University of study. Prerequisites: Two semesters of attendance at Montana State University-Northern, approval of advisor, Chair/Dean of the College of Technical Sciences, and cooperative education coordinator. Pass/Fail only.

BUS 300 Management in Organizations

3 semester credits

A study of the basic management and organizational principles within business entities. Direct application of management theory is examined with consideration of the functional aspects of decision making, planning, application of ethics, implementation of change and corporate culture. Course will examine and evaluate organizational change with particular interest in individuals, groups and team processes as applied in the domestic business operations and international business.

BUS 332 Human Resource Management

3 semester credits

An analysis and description of present-day personnel practices; stresses labor supply sources, equal employment opportunity, employee selection processes, management and employee training, collective bargaining, grievances, job description and job evaluation analysis, and judging effectiveness of the labor force in the public and private sector. Prerequisite: BUS 300.

BUS 335 Principles of Marketing

3 semester credits

Study and analysis of the elements of marketing and marketing strategy, stressing product-development, policies, pricing strategies, promotion, distribution strategies, and market and institution structures and middlemen according to the functions they perform and other marketing information systems.

BUS 337 Consumer Behavior

3 semester credits

Basic perspectives of consumer behavior; interdisciplinary approach using the fields of economics, psychology, sociology, and anthropology as they relate to marketing; emphasizes the fundamental process of motivation, perception and learning, as well as analysis of individual and group behaviors and influences in marketing. Prerequisite: BUS 335.

BUS 350 Financial Management

3 semester credits

This course teaches broad analytical skills to future managers to help them make financial decisions. The student learns basic skills like break-even analysis, budgeting, time-value of money, risk and financial statement analysis. They will apply those concepts to more sophisticated problems like capital budgeting projects, working capital management, and choosing sources of capital. Prerequisites: BUS 250 and ACCT 261.

BUS 355 Investments

3 semester credits

This course is devoted to the study of various types of investments including stocks, bonds, real estate, insurance, IRAs, commodities, collectibles, and limited partnerships. The course will also examine tax implications of investments, investment analysis, and investment strategies. Prerequisites: Junior standing or consent of instructor, and BUS 350.

BUS 380 Operations Management

3 semester credits

Management processes applied to design and operation of a production or service system. This course includes various methods of forecasting sales, linear programming, inventory and material management, physical facilities design, critical path and PERT scheduling, and quality control. Prerequisite: BUS 250.

BUS 405 Ethics in Management and Technology

3 semester credits

An analysis of the technical, social, and environmental forces which influence business activities and decision-making. The impact of business decisions on society and the influence and impact of society on business, social responsibility, business and society in the role of business decision making are discussed. The role of personal and organizational values and beliefs on business ethics.

BUS 406 Management Information Systems

3 semester credits

Concepts of MIS from a user's perspective. Explores the questions of analysis design, selection and implementation of MIS. How do I use information as a manager? How do I organize the MIS department's information in a form I can use and understand (methods and procedures)? This is a non-technical computer course which includes forecasting, PERT/CPM, inventory models, and written and oral communications. Prerequisites: CIS 111 and BUS 250.

BUS 410 International Business

3 semester credits

The course draws on the basic management skills developed in the basic business courses and applies those skills to the international arena. The functional, economic, political, and financial aspects of international business are explored. Two specific areas which are addressed in the second half of the course are corporate strategy techniques for analyzing an international market and human resource management techniques for addressing cultural differences. Prerequisites: BUS 300.

BUS 412 International Management

3 semester credits

An introduction to the contrasts of managerial techniques as they are applied to the international business world. American, Japanese and European management styles are discussed, particularly as they apply to personnel, production, socio-political, and planning problems. The international concept of leadership is examined. Prerequisite: BUS 410.

BUS 414 Marketing Research

3 semester credits

This course addresses the five basic issues of marketing research. Those issues are questionnaire design, sampling plans, data collection methods, data analysis procedures, and report writing and presentation. It is presented with the idea that research is problem-oriented and directed toward satisfying consumer wants and needs. Prerequisites: BUS 250 and BUS 335.

BUS 420 Business Policies

3 semester credits

This is the capstone of the business curriculum. The strategic planning process is emphasized in the formulation of organizational policies and in the administration of those policies. Advanced case study techniques are applied to real world situations. This course meets the University requirements for a "capstone course". Prerequisites: Senior standing and completion of all major business requirements.

BUS 430 Senior Project

3 or 6 semester credits

The student will work on an approved project, under the supervision of a faculty member. The project will include goals and objectives appropriate to a senior-level course, and must include some device for evaluating completion of those goals. Development, approval and evaluation of the project will be done by a panel of three business faculty. This course meets the University requirements for a "capstone course". May be repeated for credit. Prerequisite: Senior standing.

BUS 440 Internship

6 or 12 semester credits

A planned and supervised work-learning experience extending the student's learning experience in industry, business, government or community service agencies related to the University program of study. The internship is an alternative to cooperative education, and will only be used in situations where the employer is unable to pay for the student's employment. Prerequisite: see section on cooperative education in this catalog.

BUS 479 Cooperative Education

1, 3, 6 or 12 semester credits

A planned and supervised work-learning experience extending the student's learning experience in industry, business, government or community service agencies related to the University program of study. Prerequisites: Cooperative Education 279 or Junior standing and approval of advisor, Chair/Dean of the College of Technical Sciences, and cooperative education coordinator. Pass/Fail only.

ENGINEERING TECHNOLOGY: CIVIL ENGINEERING TECHNOLOGY

CET 173 Architectural Construction and Materials

3 semester credits

Introduction to construction materials and methods. Building systems and construction details. Emphasis is placed on selection of materials and methods. Laboratory section performs site investigations observing materials and their properties. **Course Fee: \$12.00**

CET 181 Surveying

3 semester credits

Students involved with this subject will learn to perform the most common survey work required on a construction project, which is layout, topographical leveling, differential leveling, and transfer of elevations from one benchmark or location to another. Students will learn linear measuring with tapes, and with electronic distance meters. They will also develop the skills in using standard and automatic levels, in measuring distances and angles with the EDM, transit, and

modern instruments. Fundamental computations will be emphasized. Co requisite: MATH 125 or higher. **Course Fee: \$20.00**

CET 209 Introduction to Woodworking

3 semester credits

A study in the use of equipment and procedures used in wood construction. Areas of concentration will be wood and related materials, joint design, adhesives, fasteners, hand tools, machine tools, setup and procedures, and safety. Emphasis will be on dedicated objectives with a final project.

CET 213 Carpentry

3 semester credits

This course is designed to provide the student with an introduction to carpentry. Topics covered include the use of special tools, measuring devices, wood types, framing, floor, wall and roof construction, and evaluation of alternative construction techniques.

CET 220 Construction Management & Bid Estimation

3 semester credits

Preparing cost estimates of construction projects. Introduction to construction contracts. Construction planning and scheduling. Using software for estimating and scheduling. Prerequisite: CET 173. **Course Fee: \$15.00**

CET 221 Engineering Mechanics

3 semester credits

Applied mechanics with analytical and graphical application of physical principles to engineering related problems. Newton's Laws of motion, vectors, equilibrium, friction, properties of areas and solids, trusses, beams, and fluid pressures. Introduction to dynamics of particles and strength of materials. Co requisites: PHYS 231, and MATH 125 or higher. **Course Fee: \$6.00**

CET 232 Strength of Materials

3 semester credits

Mechanics of materials and material properties. Study of stresses, strains, and deformation in different materials. Beam deflections, buckling, torsion, and mechanics of structural elements are introduced. Prerequisite: CET 221. **Course Fee: \$6.00**

CET 279 Cooperative Education

1 or 3 semester credits

A planned and supervised work-learning experience in industry, business, government, or community service agencies related to the University program of study. Prerequisites: Two semesters of attendance at Montana State University-Northern, approval of advisor, Chair/Dean of the College of Technical Sciences, and cooperative education coordinator. Pass/Fail only.

CET 305 Engineering Economics

3 semester credits

The role of engineering economy in the decision making process. Cash flow and interest. Taxes and after-tax economy studies. Measure of worth and economic risk analysis. Prerequisite: Instructor approval.

CET 307 Structural Analysis

3 semester credits

Loads on building according to Uniform Building Code (UBC). Internal forces and deformations of statically determinate trusses and frames. Influence lines and loadings. Introduction to matrix-displacement method of structural analysis. Using software for structural analysis. Prerequisite: CET 232

CET 315 Soil Mechanics & Foundations

4 semester credits

Engineering properties of soil. Laboratory testing to determine soil characteristics. Shallow foundations and retaining structures. Prerequisite: CET 232. **Course Fee: \$25.00**

CET 361 Design and Details of Steel Buildings

4 semester credits

Design of steel members according to American Institute of Steel Construction Code. Both calculations and construction details are emphasized. Prerequisite: CET 232. **Course Fee: \$10.00**

CET 375 Applied Mechanics of Fluids

3 semester credits

Introduction to fluids, fluid properties, hydrostatic forces, fluid flow, pipeline systems, open channels, and fluid machinery. Prerequisite: CET 232. **Course Fee: \$10.00**

CET 385 Highway Design and Construction

4 semester credits

Intended as a first course in highway engineering. It is inclusive of surveying topics pertinent to the design and layout of highways. The transportation engineering profession, geometry, pavement selection, highway soil mechanics and characteristics of the vehicle, driver, pedestrian, and the road will be discussed. A semester design project based on fieldwork will be completed as part of the laboratory section. Prerequisite: CET 181 or consent of instructor. **Course Fee: \$5.00**

CET 411 Reinforced Concrete Design & Details

4 semester credits

Design of reinforced concrete members according to American Concrete Institute (ACI) code. Both calculations and details of reinforcing steel are emphasized. Prerequisite: CET 232. **Course Fee: \$15.00**

CET 479 Cooperative Education

1 or 3 semester credits

A planned and supervised work-learning experience extending the student's learning experience in industry, business, government, or community service agencies related to the University program of study. Prerequisites: Cooperative Education 279 or Junior standing and approval of advisor, Chair/Dean of the College of Technical Sciences, and cooperative education coordinator. Pass/Fail only.

CHEMISTRY



CHEM 111 General Chemistry

3 semester credits

General chemistry dealing primarily with physical states of matter, including nomenclature, atomic structure, chemical reactions, and acid-base theory. First of a two-semester sequence for majors that do not require a strong background in chemistry. Includes lecture and laboratory hours. **Course Fee: \$20.00**

CHEM 112 Physiological Chemistry

3 semester credits

Basic topics in organic chemistry and biochemistry; chemistry as it relates to the human body--functional groups, nomenclature, categories of compounds, and reactions, metabolism, cellular processes, nutrition, and foods. Prerequisite: High School Chemistry or CHEM 111. Second of a two-semester sequence for majors that do not require a strong background in chemistry. Includes lecture and laboratory hours. **Course Fee: \$20.00**



CHEM 121 General Inorganic Chemistry I

3 semester credits

Fundamental principles of inorganic chemistry: nomenclature, theoretical concepts of bonding, periodic trends, chemical reactions, state of matter, heat of reactions, gaseous nature, and free energy. Primarily for students planning to continue in chemistry and other fields requiring knowledge of chemical principles. Concurrent enrollment in CHEM 123 laboratory is required. Prerequisite: High School Algebra.

CHEM 122 General Inorganic Chemistry II

3 semester credits

Fundamental principles of inorganic chemistry: equilibria processes, acid-base theories, pH, K_a , neutralization, buffers, precipitation, K_{sp} , family and row periodic element characteristics, nuclear processes, and environmental problems. Primarily for students planning to continue chemistry and related fields requiring knowledge of chemical principles. Concurrent enrollment in CHEM 124 laboratory is required. Prerequisites: CHEM 121 and CHEM 123.



CHEM 123 General Inorganic Chemistry I Lab

2 semester credit

The laboratory portion of CHEM 121 dealing with experiments in nature of matter, gaseous state, heat of reactions, and other general principles of matter. Concurrent enrollment in CHEM 121 lecture is required. **Course Fee: \$22.00**

CHEM 124 General Inorganic Chemistry II Lab

2 semester credits

The laboratory portion of CHEM 122 dealing with experiments in acid-base, pH, neutralization, and qualitative analysis. Laboratory techniques in the qual scheme are examined. Concurrent enrollment in CHEM 122 lecture is required. Prerequisite: CHEM 123. **Course Fee: \$25.00**

CHEM 279 Cooperative Education

1, 3, 6 or 12 semester credits

A planned and supervised work-learning experience in industry, business, government, or community service agencies related to the University program of study.

Prerequisites: Two semesters of attendance at Montana State University-Northern, approval of advisor, Chair/Dean of the College of Arts and Sciences, and cooperative education coordinator. Pass/Fail only.

CHEM 311 Quantitative Analysis

4 semester credits

Introduction to the theory and laboratory techniques of volumetric, gravimetric, and spectrophotometer methods of analysis. Prerequisite: CHEM 122 and CHEM 124. **Course Fee: \$20.00**

CHEM 312 Quantitative and Instrumental Analysis

4 semester credits

Continuation of CHEM 311. Further examination of the theory and laboratory techniques of volumetric, gravimetric, and spectrophotometric methods of analysis. Examines the chemical principles dealing with nonaqueous processes, electrochemical principles, and instrumental techniques. Offered alternate years. Prerequisite: CHEM 311. **Course Fee: \$20.00**

CHEM 330 Biochemistry

3 semester credits

Principles of modern biochemistry. Prerequisite: CHEM 341 or consent of instructor.

CHEM 331 Biochemistry II

3 semester credits

Continuation of Biochemistry 330. Prerequisite: CHEM 330.

CHEM 341 Organic Chemistry I

3 semester credits

Organic chemistry for science and related majors with emphasis on the structure of molecules, chemical and physical properties, and reactions mechanisms of hydrocarbons, alkyl halides, and alcohols. Examines the nature of alkanes, alkenes, alkynes, cyclic alkanes, and aromatic hydrocarbon compounds. Concurrent enrollment in CHEM 343 Organic Laboratory I is required. Prerequisites: CHEM 122 and CHEM 124.

CHEM 342 Organic Chemistry II

3 semester credits

Examination of molecules, their chemical and physical properties, reactions mechanisms of ether, carboxylic acids and their derivatives, aldehydes, ketones, amines, aryl halides, phenolic compounds, and introduction into biochemistry. Concurrent enrollment in CHEM 344 Organic Laboratory II is required. Prerequisite: CHEM 341.

CHEM 343 Organic Chemistry I Lab

2 semester credits

Laboratory portion of Organic Chemistry I. Experiments in organic techniques of distillation, extraction, and recrystallization, preparation and identification of hydrocarbons, alcohol, cyclic alkanes, and alkyl halides

compounds. Concurrent enrollment in CHEM 341 is required. Prerequisite: CHEM 124. **Course Fee: \$25.00**

CHEM 344 Organic Chemistry II Lab

2 semester credits

Laboratory portion of Organic Chemistry II. Preparation and identification of ether, carboxylic acid, esters, amines, aldehydes, ketone, other compounds, and reaction mechanisms. Concurrent enrollment in CHEM 342 is required. Prerequisite: CHEM 343. **Course Fee: \$25.00**

CHEM 351 Instrumental Analysis

3 semester credits

Modern methods of chemical analysis with emphasis on spectrometric, electrometric, and chromatographic techniques of analytical chemistry. Offered alternate years. Prerequisite: CHEM 311.

CHEM 356 Physical Chemistry

3 semester credits

An introduction to Physical chemistry emphasizing the quantitative aspects of thermodynamics, kinetic processes, equilibrium situations, and electrochemical phenomena. Prerequisite: CHEM 311.

CHEM 479 Cooperative Education

1, 3, 6 or 12 semester credits

A planned and supervised work-learning experience in industry, business, government, or community service agencies related to the University program of study. Prerequisites: Cooperative Education 279 or Junior standing and approval of advisor, Chair/Dean of the College of Arts and Sciences, and cooperative education coordinator. Pass/Fail only.

COMPUTER INFORMATION SYSTEMS



CIS 110 Introduction to Computers

3 semester credits

A literacy based approach is used to survey the computer and the computer industry. Topics covered include: Microcomputer applications, input, processor, output, auxiliary storage, file and database management, communications, information system life cycle, program development and systems software, and trends, issues and career opportunities in the computer industry. An opportunity for hands-on work with standard software packages including word processors, electronic spreadsheets, database systems, and graphics packages is presented in lab sections. **Course Fee: \$5.00**

CIS 111 Integrated Business Applications

3 semester credits

An in-depth integrated application using the case method will be developed. Students will learn to use the integrated tools in modern applications programs to save time and increase the accuracy and integrity of the overall information used in building reports. OLE and file linking will be used extensively. Visual BASIC scripting will be used to increase application cohesion. **Course Fee: \$5.00**

CIS 112 Computer Systems Introduction

3 semester credits

This class covers essential skills for students entering the CIS program. Topics covered include: web page construction, photo editing, file transfer protocol (FTP), telnet, Unix, NT, diagramming tools such as b-liner and visible analyst. Command prompt interface, batch file and scripts, directory structures will be included.



CIS 115 Introduction to Programming

3 semester credits

An introduction to computer programming and problem solving techniques. Stresses modularity and structured techniques. Structured program design using design tools is heavily stressed. Programming structures including looping, sequence, and decision are thoroughly examined. Students will be exposed to the BASIC programming language with an overview of the language and specific implementation examples. Prerequisite or co-requisite: CIS 110 or equivalent competencies

CIS 155 Programming Level I

3 semester credits

Intermediate computer program design and development using structured techniques. Includes small project development. Stresses modularity, program design, implementation, and testing. Object oriented programming/object oriented design (OOP/OOD) techniques will be utilized. Prerequisites: CIS 110 or equivalent competencies and CIS 115.

CIS 161 Assembly I & Computer Architecture

3 semester credits

Introductory assembly language programming on a representative computer using a macro assembler. A survey of the fundamental design objectives of common computers, covering basic components, digital logic, number systems, character codes, CPU design elements, machine code, instruction sets, interrupts, fast memory, auxiliary storage, and data transfer. Prerequisites: CIS 110 or equivalent competencies and CIS 115.

CIS 171 Database Level I

3 semester credits

Fundamental concepts of computerized database management and database design, with emphasis on the relational model. Includes hands-on experience with a representative DBMS product. Prerequisite: CIS 110 or equivalent competencies.

CIS 255 Programming Level II

3 semester credits

Advanced programming techniques. Emphasis on functions, pointers, arrays, user defined data structures, and ADTs. A survey of fundamental data structures. Covers pointers, arrays, user defined data structures, abstract data types, time-space complexity, algorithm proofs, program testing, and operating system interactions. Computability and intractable problems are discussed. Object oriented programming and object oriented design techniques will be utilized. Prerequisites: CIS 110 or equivalent competencies, CIS 115, and CIS 155.

CIS 270 Systems Analysis and Design

3 semester credits

Study of the systematic analysis and design of computer software using case tools, data flow analysis, and culminating in a complete system design. Prerequisites: CIS 110 or equivalent competencies, CIS 171.

CIS 271 Software Engineering

3 semester credits

This course continued CIS 270. It entails program implementation, testing, debugging, and documentation of a complete system. It includes project management techniques such as ISO 9000 standards, Visual Basic, Access, ODBC connections and programming logic. Prerequisites: CIS 110 or higher, CIS 115, CIS 155, CIS 171, and CIS 270.

CIS 279 Cooperative Education

1, 3, 6 or 12 semester credits

A planned and supervised work-learning experience in industry, business, government, or community service agencies related to the University program of study. Prerequisites: two semesters of attendance at Montana State University-Northern, approval of advisor, Chair/Dean of the College of Technical Sciences, and cooperative education coordinator. Pass/Fail only.



CIS 285 Spreadsheet

3 semester credits

This class includes theory and applications of spreadsheet software. Also included are advanced features such as, programming, web linking, scripting, goal seeking, solver, application integration, list management, complex models, macro implementation, graph creation, and graphic presentation of analyzed data will be covered. Prerequisite: CIS 110 or higher, MATH 110 or higher.

CIS 300 Operating Systems Introduction

3 semester credits

Introduction to the basic principles of how operating systems function. Concepts cover single user operating systems and multi-user operating systems including the programming requirements and considerations under each. Prerequisites: CIS 110 or equivalent competencies, CIS 115, CIS 155 and CIS 255.

CIS 320 Computers in Education

3 semester credits

This class presents strategies that enable a teacher to integrate computers into their educational environment to enhance their capabilities and productivity. Topics covered include multi-media, telecommunications, and classroom management. Prerequisite: CIS 110 or equivalent competencies.

CIS 325 Information Resource Management

3 semester credits

This class will cover information management areas including BPM, collaborative and work-group software, version control software, help desk software and collaborative networking in LAN and WAN environments.

CIS 355 Programming III

3 semester credits

Advanced computer programming topics which include graphics, animation, graphic primitives, data structure, current languages (for example, Java), current technologies (for example MFC/ActiveX), and current paradigms (for example 2 Tier/ 3 Tier/n Tier). Topics also include Geographical Information Systems and spacial data manipulation such as implemented in Oracle 8. Prerequisite: CIS 115, CIS 155, CIS 255.

CIS 360 Business Telecommunications and Networking

3 semester credits

This course is an overview of network and communications using the internet and LAN, WAN and MAN configurations. This class will stress TCP/IP in relation to the OSI model. Hubs, switches, and NIC's will be configured and tested. Students will be required to perform both out-of class and in-class homework using Windows NT, Windows 2000 and Unix computers. Students will be required to install and set-up software on a network. Some work will be performed in teams. Prerequisite: CIS 110 or higher, CIS 155, CIS 255.

Course Fee: \$5.00

CIS 371 Database Level II

3 semester credits

Analysis, design, implementation, and testing of database-oriented projects. Covers advanced database concepts including relational databases, client-server databases, distributed databases, and object oriented databases. Prerequisites: CIS 110 or equivalent competencies, CIS 115, and CIS 171.

CIS 410 Enterprise Resource Planning

3 semester credits

This class covers the application of selected behavioral and quantitative decision support tools, emphasizing problem identification, technique selection, and results or computerized solution interpretations. Topics include: decision models, resource allocation models, project management models, and forecasting models including software contracts, proposals, data warehousing and data mining. Prerequisites: CIS 110 or higher competencies, MATH 110 or MATH 112.

CIS 420 Computer Teaching Methods

2 semester credits

Appropriate techniques for teaching Computer Science and Computer Information Systems at the secondary level. Includes topics for teaching computer software. Recommend completion of all computer courses prior to or during attendance in CIS 420. Prerequisite: CIS 110 or equivalent competencies, CIS 115, CIS 155, CIS 255, and CIS 320.

CIS 455 E-Commerce Programming

3 semester credits

WWW and Internet presentation and programming techniques for providing quality information content on Internet and in-house networks. Includes dynamic information generation and dissemination through the use of interactive database links, client-server connections, and distributed software architectures. Prerequisites: CIS 110 or

equivalent competencies, CIS 115, CIS 155, CIS 171 and CIS 371.

CIS 471 Information System Engineering

3 semester credits

Intensive analysis, design, and programming project. Covers professional standards of behavior. Prerequisites: CIS 110 or equivalent competencies, CIS 115, CIS 171, CIS 270, CIS 271, and CIS 371.

CIS 479 Cooperative Education

1, 3, 6 or 12 semester credits

A planned and supervised work-learning experience extending the student's learning experience in industry, business, government, or community service agencies related to the University program of study. Prerequisites: Cooperative Education 279 or Junior standing and approval of advisor, Chair/Dean of the College of Technical Sciences, and cooperative education coordinator. Pass/Fail only.

COMMUNITY SERVICE

CMSV 101 Introduction to Community Service

3 semester credits

Introduction to community service, focusing on volunteerism, the operation and purposes of non-profit organizations, a variety of approaches to working in community service, and approaches to ethics of the profession

CMSV 201 Community Service Practicum

1 semester credit

This course provides volunteer experience in the context of community service. The students will perform activities that equal at least 20 hours of community service, keep a reflective journal or portfolio, and write a final paper discussing what they have learned from the experience. It is repeatable for up to 8 credits and offered on a pass/fail basis only.

CMSV 301 Community Service Readings

3 semester credits

Close, critical, analytical reading of community service texts including general topics and specific themes. Prerequisite: Junior standing or permission of instructor

CMSV 302 Community Service Research

3 semester credits

Research and writing in community service, including research methods and resources applicable to community service. Prerequisite: CMSV 301.

CMSV 310 Grants

3 semester credits

Identification of funding needs and priorities, researching grant-giving organizations, identification of potential funding agencies, development of proposals, preparation and submission of grant applications, techniques for approaching grant-giving organizations, responses to decisions made by granting organizations, and management of grants. Prerequisite: Junior standing or permission of instructor. Requirements for graduate credit are defined in the course syllabus.

CMSV 401 Seminar in Community Service

3 semester credits

Examination of the professional, ethical, economic, cultural and social issues in community service. Capstone course for community service majors.

CMSV 510 Grants

3 semester credits

Identification of funding needs and priorities, researching grant-giving organizations, identification of potential funding agencies, development of proposals, preparation and submission of grant applications, techniques for approaching grant-giving organizations, responses to decisions made by granting organizations, and management of grants. Prerequisite: Junior standing or permission of instructor. Requirements for graduate credit are defined in the course syllabus.

COMPUTER ENGINEERING TECHNOLOGY

CPET 201 Computer Hardware I

3 semester credits

An introduction to current computer hardware leading to the students' ability to successfully pass the COMP/TIAA+ Certification exam.

CPET 260 Networking I

3 semester credits

Coverage includes the basic concepts of networking including LAN & WAN hardware and software, OSI network model and the protocol services approach to networking.

CPET 301 Discrete Mathematics

3 semester credits

This is an introductory course in mathematics and logical processes used in computer programming and design.

CPET 410 Senior Seminar-Computer Systems

3 semester credits

A seminar based course on the current developments and directions in the computer industry. The course will consist of intense research into hardware developments that will affect the 'state of the art' definition of computer systems.

COUNSELOR EDUCATION

CNSL 404 Principles of Career Education in the Elementary and Secondary School

2 semester credits

A study of the practices and recent changes in our educational system brought about by the societal and cultural forces of our time.

CNSL 504 Principles of Career Education in the Elementary and Secondary School

2 semester credits

A study of the practices and recent changes in our educational system brought about by the societal and cultural forces of our time. Graduate credit requirements are described in the course syllabus.

CNSL 610 K-12 Counseling Program Development and Administration

3 semester credits

In this course the student will examine all the elements involved in planning, developing, implementing, administering, supervising and evaluating (including placement and follow-up data) a comprehensive K-12 guidance and counseling program, especially in view of educational philosophies, school curriculum patterns, and federal/state rules and regulations. Effective consultation skills with student (clients), parents, families, teachers, school administrators, and other allied professionals will be emphasized as an integral component of the comprehensive guidance and counseling program.

CNSL 620 Educational and Psychological Appraisal

3 semester credits

A course designed to provide the counselor with the necessary background to administer and interpret a variety of instruments used to assist clients with regard to educational, vocational, and personal issues. Intelligence, aptitude, interest, achievement, and personality assessment are discussed.

CNSL 625 Theories of Counseling and Development

3 semester credits

An examination of personality theories, which have major implications for counseling. Application of these theories to counseling is discussed. An understanding of individual growth and development, including the dynamics of human behavior is emphasized.

CNSL 635 Counseling Skills and Practice

3 semester credits

In this course the student will develop basic counseling skills through a combination of didactic and experiential activities. Students will demonstrate the skills through role playing exercises and the making of Audio/Video Counseling Tapes. Counseling skills will be examined in light of such topics as suicide, child abuse, teenage pregnancy, family relations, separation/loss/grief, and eating disorders. Counseling skills will also be examined with regard to counseling theory as well as cross-cultural considerations. Prerequisite: CNSL 625.

CNSL 638 Counseling Practicum

3 semester credits

In this practicum course, counselor-interns/students will develop skills necessary to apply basic competencies to the establishment of therapeutic relationships, the use of therapeutic communications, and use of influencing skills in helping clients to set goals and implement action strategies. The course demands 100 hours of practicum experiences (in and out of class) including 40 hours of direct client contact. Counselor-interns/students will be supervised a minimum of one hour per week in individual sessions and one and one-half hours per week in a group sessions. Prerequisites include: CNSL 620, CNSL 625, CNSL 635, or permission of instructor. This course is a prerequisite for CNSL 680.

CNSL 643 Child and Adolescent Counseling

3 semester credits

The application of counseling theories and techniques to preschool and school age (K-12) children with an emphasis

on the family dynamics and within the educational and sociopolitical environment is investigated. Processes to integrate these issues into practice will be demonstrated and mastered by the students.

CNSL 644 Marriage & Family Counseling

3 semester credits

This course will acquaint students with a range of theories used in the diagnosis and treatment of couples and families with an emphasis on approaching clients from a system's based approach. Therapeutic interventions and appropriate treatment applications relative to premarital and marital couples with and without children with an emphasis on families of origin will be explored. Approaches to effective case management and consultation with families, school systems, and other professionals will also be presented.

CNSL 645 Advanced Counseling Theory

3 semester credits

In this course students will increase their knowledge of counseling theory by studying some of the lesser known psychological counseling theories. Course topic areas will include: Primal Scream, Provocative Therapy, EST, etc. Prerequisite: CNSL 625.

CNSL 648 Professional Ethics

2 semester credits

This course will provide the student with an introduction to the ethical issues presently facing professionals in the fields of counseling and education. Mental health providers are working in an environment where professionals who are not trained in the human services arena review their activities and these third parties have significant impact on the therapeutic relationship. Counselor effectiveness is contingent on sound ethical practices that provide proactive, effective strategies that are not subject to adverse legal action. A sound knowledge of ethical standards ensures that providers avoid ethical traps that compromise professional integrity.

CNSL 651 Ethnicity and Family Counseling

3 semester credits

In this course the student will examine the contribution of ethnic heritage to family makeup and functioning. The major ethnic groups of the U.S. population will be studied along with the various counseling approaches that would be appropriate for each. Prerequisite: EDUC 643.

CNSL 652 Multi-cultural Counseling

2 semester credits

Application of counseling theories and techniques as they apply to the unique concerns and issues of diverse groups such as racial, ethnic, cultural minorities, and special populations will be examined. A focus on individual and cultural characteristics requiring specific skills necessary for the effective practice of counseling when working with diverse populations will be explored.

CNSL 653 Addiction Counseling

3 semester credits

In this course the student will examine the various types of addictions and the counseling approaches that would be appropriate for each. Examples of course topic areas are: alcohol, drugs, gambling, cigarettes, food, etc.

CNSL 654 Crisis Intervention Counseling

2 semester credits

This course represents an examination of crisis situations and viable counseling interventions based on the application of theoretical and ethical implications. An understanding of crisis (recognizing and defining crisis), crisis intervention models and implementation of specific crisis intervention techniques and strategies will be explored.

CNSL 655 Counseling and Human Sexuality

3 semester credits

In this course the student will explore the various dimensions of human sexuality such as myths vs. factual information, sexual dysfunctions, and treatment strategies in counseling. Students will explore current research as well as their own sexual attitudes/feelings/values so as to promote sensitivity and effective intervention by counselors.

CNSL 656 Counseling and College Student Personnel Services

3 semester credits

This course will examine student affairs in higher education focusing on the foundations of the profession, its theoretical base, and models of practice. The class will also study major problem areas in the field as well as the policies and procedures for effective management.

CNSL 657 Community & Agency Consultation

2 semester credits

This course will provide an overview of the theory and practice of counseling in human services agencies and other community settings. Emphasis will be placed on the role, function, and professional identity of the community counselor. Principles and practices of community outreach, intervention, education consultation, and client advocacy will be examined.

CNSL 658 Diagnosis & Treatment in Counseling

3 semester credits

This course will explore the diagnostic and treatment processes employed by mental health professionals functioning within clinical settings. Students will develop specific skills in assessment, diagnosis, and the development of treatment plans. The course will explore the paradigms of mental and emotional dysfunction, with an emphasis on clinical techniques and professional practices used in the evaluation and treatment of individual psychological disturbances.

CNSL 660 Counseling & Medications

2 semester credits

This course will familiarize students with the behavioral descriptors and diagnostic issues, test correlates and intervention options associated with the pharmacological dimensions of counseling and psychotherapy. This course is grounded on the basic assumption that a multi-modal treatment model is usually the optimal approach towards case management and that a holistic appreciation of the client's physiological, cognitive, emotional and behavioral dimensions is crucial to successful intervention.

CNSL 661 Group Dynamics/Counseling

3 semester credits

In this course the student will examine the theory and techniques of group counseling. Course topic areas will include: group dynamics, the types of groups, the stages of the group process, therapeutic forces within the group, etc. Prerequisite: CNSL 625.

CNSL 662 Advanced Group Counseling

3 semester credits

In this course the student will increase their knowledge of group counseling by receiving a supervised experience in forming and leading a group. Course topic areas will include: the issues involved in forming a group, the role/responsibilities of both the group LEADER and group MEMBER throughout the group process, etc. Prerequisite: CNSL 661.

CNSL 671 Career Information Systems

2 semester credits

Students will become familiar with the theories and techniques of career counseling. Course topic areas will include: theories of career development, techniques of career counseling, and assessment instruments utilized in career counseling.

CNSL 672 Advanced Career Counseling

3 semester credits

In this course the student will increase his/her knowledge of career counseling through application. Course topic areas will include: Career education, establishing a career guidance program, the use of computers in career counseling, resume writing, conducting a job search, preparing for a job interview, etc. Prerequisite: CNSL 671.

CNSL 679 Graduate Seminar

1-3 semester credits

An investigation of topics of current concern and interest in counseling and development.

CNSL 680 Counseling & Development Internship

6 semester credits

An extended practical experience in public schools or private enterprise where the counselor trainee acquires 300 hours of knowledge and skills under professional supervision. The trainees will acquire knowledge of referral agencies and community services as well as observation and practice in the field of counseling. Prerequisites: CNSL 620, CNSL 625, CNSL 635, and Admission to Candidacy.

CNSL 682 Advanced Counseling Practicum

6 semester credits

A continuation of the counseling internship where the student gains additional practical experience in the application of knowledge, skills, techniques and supervision in the area of counseling. Prerequisite: CNSL 680.

CNSL 684 Internship: Supervision and Administration in Counseling

3 semester credits

The course is designed to enable students to design, implement, administer, supervise, and evaluate comprehensive counseling programs.

CNSL 698 Graduate Research

3 or 6 semester credits

Research and investigation into approved topics and problems. The student's Graduate Program Committee must approve the research plan and final product. May be repeated. A limit of 6 credits may be applied to your program.

DIESEL

DIES 104 Introduction to Diesel Engines

3 semester credits

Construction, operation, and repair of diesel engines; logical steps of procedure for engine reconditioning; installing and timing of fuel injection components. Emphasis will be placed on diesel engine component reconditioning, engine tune-ups, and use of special diagnostic tools. To be taken concurrently with DIES 114.

DIES 114 Introduction to Diesel Engines Lab

3 semester credits

This course will give the student hands-on experience rebuilding diesel engines and components. The student will learn manufacturer's procedures on engine rebuilding and special tool usage. To be taken concurrently with DIES 104. **Course Fee: \$15.00**

DIES 115 Introduction to Diesel Fuel Systems

4 semester credits

This is an introductory lab in diesel fuel injection systems. This lab will include the identification, disassembly, assembly, troubleshooting, repair, and adjustment of the following fuel systems components: Inline pumps, distributor pumps, Cummins fuel system, unit injectors, and injectors. **Course Fee: \$6.00**

DIES 179 Cooperative Education

1, 2, or 3 semester credits

This is a planned and supervised work-learning experience in business or industry related to the Diesel program at MSU-Northern. Prerequisite: Students must be a high school graduate with a cumulative grade point average of 2.00; have been involved in a high school work-based learning program (Tech Prep); be registered at MSU-Northern; recommended by the high school coordinator; and have signatures from their university advisor, Chair/Dean of the College of Technical Sciences, and work-based (Tech Prep) learning coordinator. Pass/Fail only.

DIES 204 Introduction to Hydraulics and Pneumatics

2 semester credits

Theory and application of hydraulics and pneumatics used in automotive, agriculture, heavy equipment, and construction industries; To be taken concurrently with DIES 214.

DIES 214 Introduction to Hydraulics and Pneumatics Lab

2 semester credits

Application of hydraulics and pneumatics. Students will demonstrate hydraulic principles on live work stations. They will work with, tear down, and assemble equipment. They will also work on open and closed center systems, fixed and variable displacement pumps, linear and rotary actuators,

pressure and flow controls, and directional valves. To be taken concurrently with DIES 204. **Course Fee: \$13.00**

DIES 216 Heavy Duty Power Trains

4 semester credits

This course will give the students hands-on experience working on heavy duty power train components. Emphasis will be placed on calculating gear ratios and power flow on industry's common transmissions, final drives, and clutches. The student will measure drive line angles and diagnose vibration complaints. **Course Fee: \$5.00**

DIES 219 Heavy Duty Chassis

4 semester credits

A course dealing with braking systems, suspensions, and alignment of medium and heavy duty vehicles. The major emphasis will be on air brakes, methods used to check and adjust alignment, and inspection and repair methods for suspension systems. **Course Fee: \$3.00**

DIES 262 Diesel Engine Diagnosis and Repair

2 semester credits

This course will include engine assembly and engine start-up after assembly. The course will also coordinate set-up, testing, and diagnosis of engine problems using test instruments and engine dynamometer. To be taken concurrently with DIES 272. Prerequisites: DIES 104 and DIES 114

DIES 272 Diagnosis of Diesel Engine Repair Lab

4 semester credits

This course will give the student hands-on experience on diagnosing diesel engines using the proper test equipment. Diesel engine repair and assembly are addressed. To be taken concurrently with DIES 262. **Course Fee: \$17.00**

DIES 273 Diesel Shop Practices

4 semester credits

A course emphasizing actual shop operations: Long- and short-term jobs covering all aspects of a vehicle. It also includes vehicle maintenance, shop flat-rate procedures, work order and warranty claim procedures. Prerequisites: DIES 262 and DIES 272. **Course Fee: \$17.00**

DIES 279 Cooperative Education

1, 3, 6 or 12 semester credits

A planned and supervised work-learning experience in industry, business, government, or community service agencies related to the University program of study. Prerequisites: Two semesters of attendance at Montana State University-Northern, approval of advisor, Chair/Dean of the College of Technical Sciences, and cooperative education coordinator. Pass/Fail only.

DIES 314 Hydraulics and Pneumatics II

4 semester credits

Application of hydraulics and pneumatics with emphasis on live work. Troubleshooting and diagnostics of hydraulic systems including testing, adjustment, and repair of components. Prerequisites: DIES 204 and DIES 214. **Course Fee: \$12.00**

DIES 420 Diesel Shop Management

2 semester credits

This course will cover management of equipment including establishing preventative maintenance programs, cost per hour operation, and investment analysis. Selected computer programs will be used.

DIES 434 Current Model Year Technology (Capstone Course)

3 semester credits

Current topics to bring Seniors up to date on changes in heavy duty technology, to include current model year. Provides latest information on equipment, systems components, troubleshooting and repair. Course will also review major diesel topics to enhance Senior students experience. Prerequisite: Senior standing.

DIES 440 Advanced Fuel Systems

4 semester credits

A course dealing with the diagnosis and repair of fuel systems using the proper test equipment and test stands. Prerequisites: DIES 115 and Senior standing. **Course Fee: \$10.00**

DIES 450 Diagnosis of Power Shifts and Heavy Duty Automatics

4 semester credits

This is a course in Heavy Duty Power Shifts and Automatic Transmissions 6000 GVW and larger. This course consists of lab and lecture time covering the components, theory of operation; diagnosis; using proper instrumentation and manuals; and repair; with emphasis on troubleshooting and failure analysis. Prerequisites: DIES 216 and ATDI 257. **Course Fee: \$12.00**

DIES 479 Cooperative Education

1, 3, 6 or 12 semester credits

A planned and supervised work-learning experience extending the student's learning experience in industry, business, government, or community service agencies related to the University program of study. Prerequisites: Cooperative Education 279 or Junior standing and approval of advisor, Chair/Dean of the College of Technical Sciences, and cooperative education coordinator. Pass/Fail only.

DRAFTING



DRFT 131 Technical Graphics I

4 semester credits

The student will gain knowledge and skills needed to produce drawings and understand basic drafting theory. Topics developed on the board will include sketching, lettering, instruments, scaling, applied geometry, orthographic projection, dimensioning, applied technical mathematical relations, primary auxiliary views, sections, threads, and weld symbols. **Course Fee: \$7.00**

DRFT 132 Descriptive Geometry

3 semester credits

Advanced theory and practices in descriptive geometry construction and pattern development in preparation for advanced courses in Design Drafting. Prerequisite: DRFT 131, or permission of instructor. **Course Fee: \$7.00**



DRFT 156 Introduction to CAD

3 semester credits

This is a systems oriented course designed to introduce students to the concepts, techniques, and applications of PC-based computer aided drafting. It is the intent of the course to provide students with competencies that will allow them to use the system to create drawing files and down load files for hard copies. Command structure, coordinate systems, text dimensions, and plotting will be covered. **Course Fee: \$7.00**

DRFT 201 Residential Drafting

3 semester credits

The development of the principles in construction drawings of an average wood frame residential structure. A complete set of working drawings with blue line prints will be developed on the drawing board. Prerequisite: DRFT 132. **Course Fee: \$7.00**

DRFT 205 Machine Drafting

3 semester credits

The study and application of standards used for producing working drawings, including the fundamentals of geometric dimensioning and tolerancing. Both detail and assembly drawings will be mechanically produced. Prerequisite: DRFT 131. **Course Fee: \$7.00**

DRFT 244 Topographic Mapping and GIS Applications

3 semester credits

Fundamentals of mapping and geographic information systems (GIS). Includes applications of mapping projections, presentation of surveying information, and GIS methods. Mapping and GIS computer applications will be used and developed throughout the course. Prerequisite: DRFT 156 and CIS 171. **Course Fee: \$7.00**

DRFT 256 3D CAD

3 semester credits

This is a study in advanced CAD concepts and procedures to develop three-dimensional wireframe models. Emphasis will be on the creation and use of 3D primitives, surface modeling, basic solids modeling, shading techniques, and the use of animation software. Exercises will include rendered output to paint type printers. Prerequisite: DRFT 156. **Course Fee: \$7.00**

DRFT 279 Cooperative Education

1, 3, 6 or 12 semester credits

A planned and supervised work-learning experience in industry, business, government, or community service agencies related to the University program of study. Prerequisites: Two semesters of attendance at Montana State University-Northern, approval of advisor, Chair/Dean of the College of Technical Sciences, and cooperative education coordinator. Pass/Fail only.

DRFT 308 Methods of Teaching Drafting

3 semester credits

The purpose of this course is to provide experiences involving presentation and communication techniques that are essential for effectively teaching drafting. New technological advancements in the discipline will be

researched by the student. Prerequisite: Admission to Teacher Education. **Course Fee: \$7.00**

DRFT 328 Technical Illustration

3 semester credits

The application of pictorial representations to describe external and internal design features of manufactured components, subassemblies, and completed products; and construction projects. Prerequisite: DRFT 132. **Course Fee: \$7.00**

DRFT 336 Process Piping

3 semester credits

The fundamentals of process piping design and the calculation of isometric offset distances. Symbols and terminology associated with the profession will be applied in solving selected drawing assignments. CAD programs will be introduced. Prerequisites: DRFT 132 and DRFT 156. **Course Fee: \$7.00**

DRFT 356 CAD Presentation

4 semester credits

A study in the effects of using CAD images, animation, and video for professional presentations. Students will explore a variety of software and techniques. A final project will be required. Prerequisite: DRFT 256 or instructor permission. **Course Fee: \$7.00**

DRFT 409 Industrial Product Design

3 semester credits

An advanced course designed to prepare the student for the basics of mechanical design. Techniques and procedures used in the design process, geometric tolerancing and dimensioning, and the application of CAD will be studied. Prerequisites: DRFT 205 and DRFT 256. **Course Fee: \$7.00**

DRFT 416 Industrial CAD Modeling

3 semester credits

The student will explore advanced computer modeling techniques used in industrial design. Students will experiment with various applications in solving assigned problems. Prerequisite: DRFT 256, DRFT 356, or consent of instructor. **Course Fee: \$7.00**

DRFT 456 CAD Presentation II

3 semester credits

A continuation in the study of CAD presentation and simulation techniques that builds on the skills learned in DRFT 356. Advanced multimedia and 3D studio concepts and methods will be explored to create still and animated images. Prerequisite: DRFT 356. **Course Fee: \$7.00**

DRFT 457 Architectural CAD

3 semester credits

This is a system oriented course designed to introduce students to the concepts and techniques involved with AEC-CAD applications software. Applications relating to residential drawing and small commercial design will be explored. A plot plan, foundation plan, floor plan, electrical plan, elevations, and a 3D pictorial will be developed. Prerequisites: DRFT 201 and DRFT 256. **Course Fee: \$15.00**

DRFT 479 Cooperative Education

1, 3, 6 or 12 semester credits

A planned and supervised work-learning experience extending the student's learning experience in industry, business, government, or community service agencies related to the University program of study. Prerequisites: Cooperative Education 279 or Junior standing and approval of advisor, chairperson of the department, and cooperative education coordinator. Pass/Fail only.

DRAMA

DRMA 109 Drama Participation

3 semester credits

Classroom study, research and practical experience in the technical production aspects of presenting a play, including scenery design and construction, props, lighting, sound, promotion, crew, stage and house management. Includes practicum in technical production and the study of historical and artistic concerns in technical design. (May be repeated once for additional 3 credits.) **Course Fee: \$10.00**

DRMA 123 Introduction to Theatre

3 semester credits

Study of development of theatre and dramatic literature. Reading of plays representative of theatrical styles and genres. Overview of elements of theatrical production.

DRMA 210 Studies in Drama

3 semester credits

The intensive study of one or more subjects from dramatic literature and theatre history. Reading will include the works of one or more major dramatists. The subject(s) to be studied, which may include women playwrights, will vary at the discretion of the instructor. May be repeated once for credit.

DRMA 220 Acting

3 semester credits

Study of realistic approach to stage acting. Mastery of basic stage terminology. Improvisation and scene work.

DRMA 300 History of Theatre

3 semester credits

A chronological study of the development of the Western theatrical tradition from theories of origins and Greek and Roman theatre, through the development of the modern theatre in Europe and America. Focuses on theatre architecture, production methods, significant dramatists, directors, actors and designers, and the relationship of theatre to society.

DRMA 325 Methods of Teaching Elementary and Secondary Drama

3 semester credits

A study of approaches to incorporating dramatic activities into elementary and secondary school curricula, including ideas for equipping and operating an educational theatre plant, ways of dealing with extracurricular dramatic activities, and issues surrounding theatrical endeavors related to school programs and the community at large.

DRMA 331 Theatre Practicum

3 semester credits

Supervised advanced projects in performance and/or production for theatre students. Prerequisite: DRMA 109.

DRMA 360 Directing

3 semester credits

Study of basic stage directing techniques, the history of directing, and the role of the director in the contemporary theatre. Direction of a one-act play or substantial scene from a full-length play, along with written work and examinations. Prerequisite: Consent of instructor.

ECONOMICS

ECON 241 Microeconomic Principles

3 semester credits

Principles of rational choice, price determination, market resource allocation, competition, and the role of government in the economy. Prerequisite: University competency in math or permission of instructor.

ECON 242 Macroeconomic Principles

3 semester credits

Principles of national income and product accounting, aggregate demand and supply, employment, monetary theory, macroeconomic stabilization, and basic principles of international trade and finance. Prerequisites: ECON 241 and University competency in math.

ECON/HIST 346 Business and Economic History of the United States

3 semester credits

Students will study the growth and development of the U.S. Economy and business transformation from colonial times to the mid-20th century. The central organizing focus concerns the economic, cultural, and constitutional incentive structures in America that have motivated entrepreneurship and efficient resource use. A background in basic economics or business theory is useful but not required.

ECON/POL 348 Public Choice and the Public Interest

3 semester credits

This is a study of political economy focusing on what modern public choice and public interest models say about the proper boundaries of the public and private sectors. It analyzes the rent-seeking activities of special interest groups and the relative impacts of altruism and self-interest in explaining political behavior and governmental policies in democratic systems. The material focuses on the nature of public goods, market failures, government regulation, and wealth redistribution, among other topics. Theoretical, historical, and empirical forms of evidence are brought to bear on the issues.

EDUCATIONAL PSYCHOLOGY

EDPY 112 Introduction to Brain Compatible Learning

3 semester credits

This is an introduction to learning theory with an emphasis on brain-based research. The focus will be on learner-

centered understanding, brain processing and an orientation to the field of education.

EDPY 215 Introduction to Education Psychology

3 semester credits

This course will focus on concepts of educational psychology with an emphasis on learning theories. Topics relating to diversity, including special needs students, and the impact of culture within the classroom's learning and teaching environment plays a central part in the curriculum. Field observations in school (elementary, secondary, and 5-12) provide a rich experiential opportunity for students to relate educational psychology theories to the classroom, and observe how an individual's biopsychosocial, environmental, and cultural characteristics influence teaching and learning.

EDPY 350 The Education and Psychology of Exceptional Children

3 semester credits

In this course the student will examine the various categories of exceptionality (gifted, mentally retarded, learning disabled, visual/hearing/health impaired, physically disabled, and emotionally disturbed) by analyzing each category utilizing the following format: History, definition, prevalence, causes, characteristics, assessment, intervention, curriculum implications, mainstreaming, and future considerations. In-class learning activities will be supplemented by having the student participate in a laboratory experience that involves a 20-hour field placement in a special education setting.

EDPY 425 Learning Disabilities

3 semester credits

In this course the student will examine learning disabilities by studying the following: Theory of etiology, assessment, and teaching strategies utilized to remediate the disabilities. The course will also focus on other related topics such as the various types of assessment reports, the planning of individualized educational programs, the different systems for delivering special educational services, and future issues in the field of learning disabilities.

EDPY 525 Learning Disabilities

3 semester credits

In this course the student will examine learning disabilities by studying the following: Theory of etiology, assessment, and teaching strategies utilized to remediate the disabilities. The course will also focus on other related topics such as the various types of assessment reports, the planning of individualized educational programs, the different systems for delivering special educational services, and future issues in the field of learning disabilities. Graduate credit requirements are described in the course syllabus.

EDPY 550 The Education and Psychology of Exceptional Children

3 semester credits

In this course the student will examine the various categories of exceptionality (gifted, mentally retarded, learning disabled, visual/hearing/health impaired, physically disabled, and emotionally disturbed) by analyzing each category utilizing the following format: History, definition, prevalence, causes, characteristics, assessment, intervention, curriculum implications, mainstreaming, and future considerations. In-class learning activities will be supplemented by having the

student participate in a laboratory experience that involves a 20-hour field placement in a special education setting. Graduate credit requirements are described in the course syllabus.

EDPY 604 Applied Classroom Psychology

3 semester credits

This course will examine the theories of learning and the principles of psychology as a way of enhancing the understanding of student cognitive/psychological functioning.

EDUCATION

EDUC 100 Foundations of Education

3 semester credits

This course will focus on the history, purpose, role and scope of education in the U.S. Topics will include curriculum development, state and national standards, current trends in education and professional development. A field observation at the elementary and secondary levels will focus primarily on the role of the teacher, parents, and student, and purpose of education.

EDUC 259 Field Experience

1-3 semester credits

Supervised experience in community institutions and organizations. Investigation and competency development as related to a student's major and/or minor area. May be repeated for credit.

EDUC 300 Introduction to Curriculum Planning and Practice

3 semester credits

This course is an introduction to curriculum planning and practice. An overview of curriculum development, unit planning with an emphasis on lesson planning is the focus. How lesson design affects classroom management, how to meet state and national curriculum and practice standards, and how to integrate instructional technology in lesson and unit development are topics. Secondary education candidates will focus on reading across the curriculum; elementary education candidates will focus on content curriculum. Prerequisite: Admission to Teacher Education. This course is a prerequisite for all methods courses.

EDUC 302 Methods of Teaching Elementary Mathematics

2 semester credits

Theories and techniques of teaching elementary school mathematics. Prerequisite: Admission to Teacher Education, EDUC 300 and EDUC 321.

EDUC 303 Methods of Teaching Elementary Music

2 semester credits

A methods course presenting various aspects of elementary school music. Emphasis placed upon the development of the student's own music skills as a conductor and on classroom instruments including piano, guitar, autoharp, recorder and various percussion instruments. Prerequisites: MUS 110 or consent of instructor and Admission to Teacher Education, EDUC 300 and EDUC 321.

EDUC 304 Methods of Teaching Elementary Science

2 semester credits

A hands-on course which includes a study of the nature of science, a review of Piagetian theory and its implications for teaching elementary science, and information on sources of materials and activities. Each student will prepare and present lesson plans according to the experimental, discovery, and inquiry models for teaching elementary science. Prerequisite: Admission to Teacher Education, EDUC 300 and EDUC 321.

EDUC 306 Methods of Teaching Elementary Social Studies

2 semester credits

Study of theory and practices in the teaching of social studies in the elementary school; stresses interrelationships among the several social science disciplines of history, geography, political science, government, economics, and sociology as related to the elementary school program. Prerequisite: Admission to Teacher Education, EDUC 300 and EDUC 321.

EDUC 307 Methods of Teaching Elementary Integrated Mathematics and Science

3 semester credits

A methods course presenting an integrated approach to teaching mathematics and science in the elementary grades. Students will examine a variety of instructional techniques for both mathematics and science with a focus on integrated instruction. Prerequisite: Admission to Teacher Education. This course serves as an alternate to EDUC 321 Integrating Technology into Education and EDUC 300 Introduction to Curriculum Planning and Practice.

EDUC 308 Methods of Teaching Elementary and Secondary Art

2 semester credits

Theory and practice of teaching art appropriate to grade and ability level. Instruction will include approaches to teaching, the elements and principles of design, art history, art production, and criticism. Prerequisites: Art 100 or consent of instructor and Admission to Teacher Education, EDUC 300 and EDUC 321.

EDUC 310 Methods of Teaching Integrated Creative Arts

3 semester credits

This course teaches strategies and methodology to integrate the creative arts (e.g., art, music and drama) into the elementary classroom to enhance learning for all students. Emphasis will be placed upon developing the candidates' creative abilities. Prerequisites: Admission to Teacher Education, EDUC 321 Integrating Technology into Education, and EDUC 300 Introduction to Curriculum Planning and Practice.

EDUC 321 Integrating Technology into Education

1-3 semester credits

This experiential course will assist the candidate in developing competencies in the integration of instructional technology into education and in developing skills to create an electronic portfolio. This course may be repeated for up to 3 credits. This is a prerequisite for all methods courses.

EDUC 327 School Library in Teaching

3 semester credits

Organization, administration, and development of the school library; methods of cataloging and classifying; care and repair of books; stimulation of wider use of books for recreation and study; book selection, including evaluation of reference materials; service of school library to the community, the utilization of the library resources of the state. Prerequisite: Admission to Teacher Education.

EDUC 328 Library Media Resource

3 semester credits

Survey cataloging, classification, storage, and circulation of non-book media in school library. Prerequisite: Admission to Teacher Education.

EDUC 334 Teaching the Integrated Language Arts

3 semester credits

An introduction to the development of the communicative skills in the elementary grades. Both expressive and receptive skills will be studied. Emphasis will be placed upon the communicative arts as taught in the schools as well as the developmental aspects of language growth in the child. Attention will be placed upon the role of the communicative skills in the school curriculum with particular emphasis on the school reading program. Students will participate in a lab experience, which will provide an opportunity to obtain classroom-teaching experience in language arts. Prerequisite: Admission to Teacher Education, EDUC 321 Integrating Technology into Education, and EDUC 300 Introduction to Curriculum Planning and Practice. Note: EDUC 334 and EDUC 335 may not be taken concurrently.

EDUC 335 Fundamental and Corrective Strategies in the Elementary Reading Program

3 semester credits

This course is designed to investigate reading instruction in the elementary grades. This will include a study of the reading process, methods of instruction, materials available, and reading skills. Methods, procedures, and techniques of identifying, analyzing, and correcting reading difficulties will be explored. Students will participate in a lab experience which will provide an opportunity to obtain classroom teaching experience in language arts. Prerequisite: Admission to Teacher Education, EDUC 321 Integrating Technology into Education, and EDUC 300 Introduction to Curriculum Planning and Practice. Note: EDUC 334 and EDUC 335 may not be taken concurrently.

EDUC 336 Integrated Field Experience

1-3 semester credits

This course is taken by candidates in conjunction with their "methods block" of the program. Candidates will be placed in field experiences with the express purpose of practicing the methodology of teaching in various areas in a classroom setting. This course may be repeated for up to 3 credits. Prerequisite: Admission to Teacher Education Program.

EDUC 338 Aerospace Education

2 semester credits

The aerospace age and its influence on modern society. Organizing aerospace education materials into instructional units for elementary and secondary schools, offered in cooperation with the Montana Aeronautics Commission.

EDUC 347 Speech, Hearing, & Language Development of the Pre-School Child

3 semester credits

An introduction to the area of hearing, speech, and language development of the pre-school child with opportunities for the student to explore the area of disorders due to developmental problems. Prerequisite: Admission to Teacher Education.

EDUC 361 Traffic Safety Education I

3 semester credits

Basic course for the preparation of teachers in the field of traffic safety. Introduction to the history and philosophy of traffic safety. Emphasis on the behind-the-wheel phase of traffic safety in the high school program. University students will give behind-the-wheel lessons to high school students.

EDUC 362 Traffic Safety Education II

3 semester credits

A continuation of EDUC 361 with emphasis on materials, organization, and content of the classroom phase of traffic safety. University students will give additional behind-the-wheel lessons and also give classroom theory lessons to their peers. Prerequisite: EDUC 361.

EDUC 363 Motorcycle Safety

2 semester credits

Analysis of the motorcycle accident problem and the role of the high school traffic safety program in motorcycle safety. Emphasis on classroom and laboratory content, organization, and instruction techniques. Prerequisite: EDUC 361. **Course Fee: \$25.00**

EDUC 365 Motor Vehicle Law and Enforcement

2 semester credits

A course designed to give driver education teachers and other interested individuals a more complete understanding of motor vehicle code and ordinances and the basic principles of their enforcement.

EDUC 367 Simulation in Traffic Safety

2 semester credits

This course will acquaint the driver education teacher with the techniques of teaching with simulators and evaluating their performance and the student's performance. A 16-place simulator facility will be used. Prerequisite: EDUC 361.

EDUC 368 Emergency Driving Procedures and Trailer Towing

2 semester credit

Emphasis on techniques in cornering, skid control, off-road recovery, evasive maneuvers, and controlled braking situations along with an introduction to the concepts of operating a motor vehicle with another unit being towed. Prerequisite: EDUC 361.

EDUC 376 Assessment in Education

2 semester credits

This course is designed to provide candidates the foundation in assessment measures used in the K-12 classrooms that aid education decision-making. Fundamental assessment and evaluation topics include validity, reliability, item construction, test interpretation, norm-referenced, criterion-

referenced and alternative methods of assessment. **HPE Majors/Minors will substitute HPE 376 for this course.** Pre-requisite: Admission to Teacher Education, EDUC 321 Integrating Technology into Education, and EDUC 300 Introduction to Curriculum Planning and Practice.

EDUC 380 Classroom Environment and Management

3 semester credits

A methodological course introducing basic principles and procedures for managing the behavior and academic time of children in the classroom and school environment. Students will explore topics related to teacher and student communication, teaching and learning styles, discipline models and procedures, records management (including electronic management systems) and the impact of facilities on the learner. Various development and counseling theories will be examined in light of enhancing the learning and acceptance of all students. Students will also examine the various applications of counseling issues (e.g. substance abuse, cross-cultural, crisis management) as they apply to K-12 classroom practice. Prerequisite: Admission to Teacher Education.

EDUC 400 Elementary Teaching Practicum and Seminar

6 or 12 semester credits

This is a supervised student teaching experience in an accredited elementary or middle school. Experiences will include typical responsibilities of an elementary or middle school first year teacher. Seminar will be held on campus. This course provides theory-based practice at an elementary level for Student Teacher Candidates seeking Montana K-8 teacher certification. Prerequisites: Admission to Teacher Education.

EDUC 405 Current Issues in Education

3 semester credits

Consideration of current educational problems and issues in the context of their historical, philosophical, social, legal, political, and economic background and development. The purposes, roles, functions, and operations of public elementary and secondary schools are analyzed. (This course is dual listed as EDUC 505.) Students must enroll in EDUC 400, EDUC 450 or EDUC 475 concurrently. Prerequisite: Admission to Teacher Education.

EDUC 440 Assessment in the Remedial Reading Program

2 semester credits

The purpose of this course will be to examine a variety of assessment tools used to evaluate the strengths and weaknesses of individual students experiencing difficulty with reading. Both formal and informal tools will be discussed. Students will administer, score, and interpret the results of the assessment instruments in light of relevant research in reading education. Prerequisite: Admission to Teacher Education.

EDUC 445 Teaching Reading, Writing, and Critical Thinking Skills Across the Curriculum

2 semester credits

This course is designed to provide teacher education candidates with an understanding of reading, writing, and

critical thinking processes, knowledge of the skills a teacher may use to help K-12 student deal more effectively with specific content materials, and implementation of those skills in the elementary, middle and secondary school setting. Prerequisite: Admissions to Teacher Education; EDUC 421 Integrating Technology into Education, and EDUC 400 Introduction to Curriculum Planning and Practice.

EDUC 448 Reading Materials for the Elementary Child

3 semester credits

An examination of the variety of reading materials available for use in the teaching of reading and the application of those materials to the learning needs of children of differing reading competencies. Students will explore the role of reading and the communication arts in the elementary curriculum and the integration of literature in the elementary curriculum. Prerequisite: Admission to Teacher Education.

EDUC 450 Secondary Teaching Practicum and Seminar

6 or 12 semester credits

This is a supervised student teaching experience in a Student Teacher Candidate's major and minor fields in an accredited secondary school. Experiences will include typical responsibilities of a first year teacher. Seminars will be held on campus. This course provides theory-based practice at a secondary level for Student Teacher Candidates seeking Montana 5-12 teacher certification. Prerequisite: Admission to Teacher Education.

EDUC 455 Advanced Practicum in Education

3 semester credits

This course is designed to assist candidates in their final preparations prior to their student teaching practicum. Polishing of professional skills, development of a portfolio, exploration of personal teaching styles, and discussions of field practicum experiences are the focus of this course. An intensive field practicum focuses on application of theory and practice, assessment, the integration of technology in instruction, and teaching for diversity in the classroom. Prerequisites: Admission to Teacher Education; senior status; completion of all methods courses with a C or better.

EDUC 475 Elementary and Secondary Teaching Practicum and Seminar

6 or 12 semester credits

This supervised student teaching experience in an accredited elementary and secondary school to be taken by all students seeking a K-12 endorsement. Experiences will include typical responsibilities of a first year teacher. Seminars will be held on campus. This course provides theory-based practice at K-12 level for Student Teacher Candidates seeking Montana K-12 teacher certification. Prerequisite: Admission to Teacher Education.

EDUC 500 Introduction to Curriculum Planning and Practice

3 semester credits

This course is an introduction to curriculum planning and practice. An overview of curriculum development, unit planning with an emphasis on lesson planning is the focus. How lesson design affects classroom management, how to meet state and national curriculum and practice standards,

and how to integrate instructional technology in lesson and unit development are topics. Secondary education candidates will focus on reading across the curriculum; elementary education candidates will focus on content curriculum. Prerequisite: Admission to Teacher Education. This course is a prerequisite for all methods courses.

EDUC 502 Methods of Teaching Elementary Mathematics

2 semester credits

Theories and techniques of teaching elementary school mathematics. Graduate credit requirements are described in the course syllabus. Prerequisite: Admission to Teacher Education.

EDUC 503 Methods of Teaching Elementary Music

2 semester credits

A methods course presenting various aspects of elementary school music. Emphasis placed upon the development of the student's own music skills as a conductor and on classroom instruments including piano, guitar, autoharp, recorder and various percussion instruments. Graduate credit requirements are described in the course syllabus. Prerequisites: MUS 110 or consent of instructor and Admission to Teacher Education.

EDUC 504 Methods of Teaching Elementary Science

2 semester credits

A hands-on course which includes a study of the nature of science, a review of Piagetian theory and its implications for teaching elementary science, and information on sources of materials and activities. Each student will prepare and present lesson plans according to the experimental, discovery, and inquiry models for teaching elementary science. Graduate credit requirements are described in the course syllabus. Prerequisite: Admission to Teacher Education.

EDUC 505 Current Issues in Education

3 semester credits

Consideration of current educational problems and issues in the context of their historical, philosophical, social, legal, political, and economic background and development. The purposes, roles, functions, and operations of public elementary and secondary schools are analyzed. Graduate credit requirements are described in the course syllabus. Co-requisite: Enrollment in student teaching, (EDUC 400, EDUC 450, or EDUC 475) or consent of the instructor.

EDUC 506 Methods of Teaching Elementary Social Studies

2 semester credits

Study of theory and practices in the teaching of social studies in the elementary school; stresses interrelationships among the several social science disciplines of history, geography, political science, government, economics, and sociology as related to the elementary school program. Graduate credit requirements are described in the course syllabus. Prerequisite: Admission to Teacher Education.

EDUC 507 Methods of Teaching Elementary Integrated Mathematics and Science

3 semester credits

A methods course presenting an integrated approach to teaching mathematics and science in the elementary grades.

Students will examine a variety of instructional techniques for both mathematics and science with a focus on integrated instruction. Prerequisite: Admission to Teacher Education. This course serves as an alternate to EDUC 321 Integrating Technology into Education and EDUC 300 Introduction to curriculum Planning and Practice.

EDUC 508 Methods of Teaching Elementary and Secondary Art

2 semester credits

Theory and practice of teaching art appropriate to grade and ability level. Instruction will include approaches to teaching, the elements and principles of design, art history, art production, and criticism. Graduate students will have additional requirements as indicated by the instructor. Prerequisite: ART 100 or permission of instructor and Admission to Teacher Education.

EDUC 510 Methods of Teaching Integrated Creative Arts

3 semester credits

This course teaches strategies and methodology to integrate the creative arts (e.g., art, music and drama) into the elementary classroom to enhance learning for all students. Emphasis will be placed upon developing the candidates' creative abilities. Prerequisites: Admission to Teacher Education, EDUC 521 Integrating Technology into Education, and EDUC 500 Introduction to Curriculum Planning and Practice.

EDUC 521 Integrating Technology into Education

1-3 semester credits

This experiential course will assist the candidate in developing competencies in the integration of instructional technology into education and in developing skills to create an electronic portfolio. This course may be repeated for up to 3 credits. This is a prerequisite for all methods courses.

EDUC 527 School Library in Teaching

3 semester credits

Organization, administration, and development of the school library; methods of cataloging and classifying; care and repair of books; stimulation of wider use of books for recreation and study; book selection, including evaluation of reference materials; service of school library to the community, the utilization of the library resources of the state. An additional project or paper is required of graduate students.

EDUC 528 Library Media Resource

3 semester credits

Survey cataloging, classification, storage, and circulation of non-book media in school libraries. An additional project or paper is required of graduate students.

EDUC 534 Teaching the Integrated Language Arts

3 semester credits

An introduction to the development of the communicative skills in the elementary grades. Both expressive and receptive skills will be studied. Emphasis will be placed upon the communicative arts as taught in the schools as well as the developmental aspects of language growth in the child. Attention will be placed upon the role of the communicative skills in the school curriculum with particular emphasis on

the school reading program. Students will participate in a lab experience, which will provide an opportunity to obtain classroom-teaching experience in language arts. Prerequisite: Admission to Teacher Education, EDUC 521 Integrating Technology into Education, and EDUC 500 Introduction to Curriculum Planning and Practice. Note: EDUC 534 and EDUC 535 may not be taken concurrently.

EDUC 535 Fundamental and Corrective Strategies in the Elementary Reading Program

3 semester credits

This course is designed to investigate reading instruction in the elementary grades. This will include a study of the reading process, methods of instruction, materials available, and reading skills. Methods, procedures, and techniques of identifying, analyzing, and correcting reading difficulties will be explored. Students will participate in a lab experience which will provide an opportunity to obtain classroom teaching experience in language arts. Graduate credit requirements are described in the course syllabus. Prerequisite: Admission to Teacher Education, EDUC 521 Integrating Technology into Education, and EDUC 500 Introduction to Curriculum Planning and Practice. Note: EDUC 534 and EDUC 535 may not be taken concurrently.

EDUC 536 Integrated Field Experience

1-3 semester credits

This course is taken by candidates in conjunction with their "methods block" of the program. Candidates will be placed in field experiences with the express purpose of practicing the methodology of teaching in various areas in a classroom setting. This course may be repeated for up to 3 credits. Prerequisite: Admission to Teacher Education Program

EDUC 538 Aerospace Education

2 semester credits

The aerospace age and its influence on modern society. Organizing aerospace education materials into instructional units for elementary and secondary schools, offered in cooperation with the Montana Aeronautics Commission. Graduate credit requirements are described in the course syllabus.

EDUC 540 Assessment in Remedial Reading

2 semester credits

The purpose of this course will be to examine a variety of assessment tools used to evaluate the strengths and weaknesses of individual students experiencing difficulty with reading. Both formal and informal tools will be discussed. Students will administer, score, and interpret the results of the assessment instruments in light of relevant research in reading education. Graduate credit requirements are described in the course syllabus. Prerequisite: Admission to Teacher Education.

EDUC 545 Teaching Reading, Writing, and Critical Thinking Skills Across the Curriculum

2 semester credits

This course is designed to provide teacher education candidates with an understanding of reading, writing, and critical thinking processes, knowledge of the skills a teacher may use to help K-12 student deal more effectively with specific content materials, and implementation of those skills in the elementary, middle and secondary school setting.

Prerequisite: Admissions to Teacher Education; EDUC 521 Integrating Technology into Education, and EDUC 500 Introduction to Curriculum Planning and Practice.

EDUC 547 Speech, Hearing, & Language Development of the Pre-School Child

3 semester credits

An introduction to the area of hearing, speech, and language development of the pre-school child with opportunities for the student to explore the area of disorders due to developmental problems. Graduate credit requirements are described in the course syllabus. Prerequisite: Admission to Teacher Education.

EDUC 548 Reading Materials for the Elementary Child

3 semester credits

An examination of the variety of reading materials available for use in the teaching of reading and the application of those materials to the learning needs of children of differing reading competencies. Students will explore the role of reading and the communication arts in the elementary curriculum and the integration of literature in the elementary curriculum. Graduate credit requirements are described in the course syllabus. Prerequisite: Admission to Teacher Education.

EDUC 555 Advanced Practicum in Education

3 semester credits

This course is designed to assist candidates in their final preparations prior to their student teaching practicum. Polishing of professional skills, development of a portfolio, exploration of personal teaching styles, and discussions of field practicum experiences are the focus of this course. An intensive field practicum focuses on application of theory and practice, assessment, the integration of technology in instruction, and teaching for diversity in the classroom. Prerequisites: Admission to Teacher Education; senior status; completion of all methods courses with a C or better.

EDUC 561 Traffic Safety Education I

3 semester credits

Basic course for the preparation of teachers in the field of traffic safety. Introduction to the history and philosophy of traffic safety. Emphasis on the phase of traffic safety in the high school program. University students will give behind-the-wheel lessons to high school students. Graduate credit requirements are described in the course syllabus.

EDUC 562 Traffic Safety Education II

3 semester credits

A continuation of EDUC 561 with emphasis on materials, organization, and content of the classroom phase of traffic safety. University students will give additional behind-the-wheel lessons and also give classroom theory lessons to their peers. Graduate credit requirements are described in the course syllabus. Prerequisite: EDUC 361.

EDUC 563 Motorcycle Safety

2 semester credits

Analysis of the motorcycle accident problem and the role of the high school traffic safety program in motorcycle safety. Emphasis on classroom and laboratory content, organization,

and instruction techniques. Graduate credit requirements are described in the course syllabus. Prerequisite: EDUC 361.

EDUC 565 Motor Vehicle Law and Enforcement

2 semester credits

A course designed to give driver education teachers and other interested individuals a more complete understanding of motor vehicle code and ordinances and the basic principles of their enforcement. Graduate credit requirements are described in the course syllabus.

EDUC 567 Simulation in Traffic Safety

2 semester credits

This course will acquaint the driver education teacher with the techniques of teaching with simulators and evaluating their performance and the student's performance. A 16-place simulator facility will be used. Graduate credit requirements are described in the course syllabus.

EDUC 568 Emergency Driving Procedures and Trailer Towing

2 semester credits

Emphasis on techniques in blowout, off-road recovery, evasive maneuvers, and controlled braking situations along with an introduction to the concepts of operating a motor vehicle with another unit being towed. Graduate credit requirements are described in the course syllabus. Prerequisite: EDUC 361.

EDUC 576 Assessment in Education

2 semester credits

This course is designed to provide candidates the foundation in assessment measures used in the K-12 classrooms that aid education decision-making. Fundamental assessment and evaluation topics include validity, reliability, item construction, test interpretation, norm-referenced, criterion-referenced and alternative methods of assessment. **HPE Majors/Minors will substitute HPE 376 for this course.** Pre-requisite: Admission to Teacher Education, EDUC 521 Integrating Technology into Education, and EDUC 500 Introduction to Curriculum Planning and Practice.

EDUC 580 Classroom Environment and Management

3 semester credits

A methodological course introducing basic principles and procedures for managing the behavior and academic time of children in the classroom and school environment. Students will explore topics related to teacher and student communication, teaching and learning styles, discipline procedures, records management and the impact of facilities on the learner. In addition, students will examine electronic management systems for classroom use. Graduate credit requirements are described in the course syllabus. Prerequisite: Admission to Teacher Education.

EDUC 603 Curriculum Foundations and Design

3 semester credits

Examination of the historical, philosophical, sociological, economic, political, and legal foundational impacts on American school curriculum. Focus will include an analysis of these impacts in the identification of curriculum problems and the generation of curriculum designs.

EDUC 606 Research Methods

3 semester credits

The course is designed to assist teachers to develop the desire and the skills to read, interpret, evaluate, and utilize the results of systematic inquiry and empirically developed knowledge in their educational planning and decision-making. This implies a positive value orientation toward research-generated information as well as an understanding of the strengths and limitations of research methodology when compared to other approaches to developing knowledge.

EDUC 607 Educational Measurement and Statistics

3 semester credits

A course designed to enable students to understand and apply basic principles of educational and psychological measurement and evaluation emphasizing those statistical concepts used in the construction, implementation and interpretation of standardized and teacher generated measuring instruments.

EDUC 608 Multimedia Communications in Education

3 semester credits

Applies basic concepts and principles of communication to problems in teaching and learning with school and adult audiences; includes various systems approaches to instruction, multimedia presentation techniques, graphic images, Power Point, distance learning, telecommunications, and student experiences in programming materials for a specific curriculum.

EDUC 627 Supervision of Student Teachers and Field Practicum Students

3 semester credits

This course is designed to provide training and support to public school personnel who will be working directly with a student teacher or a field practicum student.

EDUC 630 General School Administration and Finance

3 semester credits

The student will examine the functions, duties and responsibilities of public school administrators in relationship to community expectations, school board policies and accreditation standards. School funding sources, the Montana foundation program and the fiscal responsibilities of public school administrators are addressed.

EDUC 633 Supervision of Instruction

2 semester credits

The course is designed to enable selected graduate degree candidates to be recommended for a Class III supervisor's endorsement. Competencies in diagnosing, designing, implementing, and evaluating instructional programs and personnel will be developed.

EDUC 636 Foundations of Early Childhood Education

2 semester credits

Study of the historical and philosophical aspects of early childhood education, teaching specific subject to pre-school and primary children.

EDUC 638 Evaluation and Assessment of the Pre-School Child

2 semester credits

An in-depth study of formal and informal methods of assessment of the pre-school child's development and methods for early intervention.

EDUC 640 School Law

3 semester credits

School law is designed to provide those students who are seeking a graduate degree or supervisor's endorsement with a basic background in legal principles and school law. This course meets the requirement for a Class III supervisor's endorsement in Montana.

EDUC 650 Critical and Creative Thinking in Learning

3 semester credits

An examination of the epistemological and environmental elements underlying critical and creative thinking. Students will understand the application of theory and technique to various content fields and learning environments. A group project proposing an application to an educational setting will be completed.

EDUC 652 Learning Systems: Theory and Design

3 semester credits

A study of systems theory and applications in human development and learning environments. Emphasis is upon the understanding of cause and effect in the design and implementation of outcome oriented applications within diverse systems. A major component is the design of a learning system approach to a situation identified by the student.

EDUC 654 Graduate Seminar

1-3 semester credits

Investigation into topics of current concern and interest in education.

EDUC 657 Project TEACH

3 semester credits

Project Teach focuses primarily on the affective domain of learning. The skills and strategies taught, as well as the research presented, focus on positive, observable teacher behaviors and classroom practices that enhance student self-esteem and create a positive and inviting learning environment.

EDUC 658 PRIDE

3 semester credits

PRIDE trains educators to ask questions that require critical thinking and employ questioning techniques that enrich the quality of learning; develop awareness of their own non-verbal communication and develop sensitivity to their students nonverbal behavior; learn systems of rewards and penalties that reduce control and learning problems and move students from extrinsic to intrinsic motivation; learn techniques for dealing with critical incidents; and develop lessons using all the skills taught in the course.

EDUC 660 Developmental and Remedial Reading

3 semester credits

Utilizing the unique development of the individual child, this course will focus on the classroom appraisal of appropriate reading skills, reading difficulties, teaching procedures, assessment and evaluation procedures, and remediation activities appropriate for the elementary school child. Students will be engaged in an examination of current trends and research in the field of reading education.

EDUC 661 Supervision and Teaching Language Arts in the Elementary School

3 semester credits

Appraisal of the elementary school language arts program in terms of principles, practices, and problems involved in the instructional program. Students will also investigate designing, implementing and evaluating the language arts program in the elementary school. Implications of research focusing on language arts and the education of the whole child will be examined.

EDUC 662 Advanced Strategies in Reading

3 semester credits

This course is designed to examine the current approaches and recent trends in the teaching of reading; present practices and implications of research in reading. Each approach will be examined in the light of present knowledge of child development and learning theory. Home and school reading partnerships will be examined.

EDUC 663 Supervision and Teaching of Elementary School Mathematics

3 semester credits

Students will investigate curriculum trends, instructional materials, and research relevant to the elementary mathematics program. Emphasis will be placed upon problem solving, critical thinking skills, and technology in the classroom. Appraisal of the elementary mathematics program with regard to designing, implementing, supervising and evaluating will be examined.

EDUC 670 Elementary Curriculum

3 semester credits

This course focuses on the broad spectrum of content in the elementary school. Students will investigate the organization of the elementary school in respect to grade divisions, the middle school concept, and evaluation of the curriculum. Content will also include an investigation of curriculum trends, instructional materials, and research relevant to a modern elementary school.

EDUC 671 Instructional Materials for the Elementary Child

3 semester credits

An examination of the variety of instructional materials available for use in the teaching of the elementary school child and the application of those materials to the learning needs of children of differing competencies. Students will develop and create a variety of materials, explore current trends and research concerning classroom materials, and examine resources available for the elementary school child. Students will also examine the role of technology in the elementary classroom.

EDUC 672 Elementary School Administration and Supervision

3 semester credits

This course will provide an exploration of the philosophy, goals, objectives, organizational structure, current research, key issues, and problems associated with the elementary school. Topics include administrative and supervisory duties regarding supervision of students, staff, student teachers, faculty; home/school public relations; public community relations; and leadership styles.

EDUC 674 Patterns for IDEAS

3 semester credits

Patterns for IDEAS is designed to help educators guide more efficient student thinking processes in the classroom, to learn awareness of their own thinking processes, to learn problem-solving strategies specifically applicable to the classroom, to develop awareness of problem solving used in real life, to learn techniques for developing critical thinking skills, and to learn patterns of thinking around which future classrooms lessons can be structured.

EDUC 675 Achieving Student Outcomes Through Cooperative Learning

3 semester credits

Achieving Student Outcomes Through Cooperative learning is designed to train educators to effectively set-up, manage and debrief group work so that students learn academics and interpersonal skills. Educators become proficient in group set-up, monitoring and debriefing. They learn how to prevent typical classroom problems that often occur during group work and manage effectively those problems that do occur. They learn to manage collaborative processes so that students learn academics and interpersonal skills simultaneously.

EDUC 677 Purposeful Learning Through Multiple Intelligences

3 semester credits

Purposeful Learning Through Multiple Intelligences will enable educators to understand in depth the characteristics of each of the intelligences, to create diverse strategies for teaching through the intelligences, and to develop various entry points for integrating the intelligences into a school wide program.

EDUC 678 Teaching Through Learning Channels

3 semester credits

Teaching Through Learning Channels is designed to give educators information about how each person learns based on current brain research and to train them to create and deliver lessons that work through these natural channels of learning.

EDUC 680 Internship

4 semester credits

An MSU-Northern directed practical experience through a responsible appointment wherein the student is provided the opportunity to acquire 200 hours of professional experience in a program (other than his/her employment situation) directly related to his/her field of specialization.

EDUC 698 Graduate Research

3 or 6 semester credits

Research and investigation into approved topics and problems. The student's Graduate Program Committee must

approve the research plan and final product. May be repeated. A limit of 6 credits may be applied to your program.

ENGINEERING TECHNOLOGY: ELECTRONICS ENGINEERING TECHNOLOGY



EET 101 Introduction to Electricity/Electronics

5 semester credits

This is a lecture/lab course that provides the foundation for major and minor courses in the Electronics Engineering Technology program. Topics include basic electrical and electronic concepts, circuit testing, troubleshooting, and the use of test equipment. **Course Fee: \$10.00**

EET 103 Electronic Fundamentals I

5 semester credits

This lecture/lab course provides an introduction to solid state devices. Topics covered include PN diode characteristics, rectifier circuits, bipolar transistors, field-effect transistors, and amplifier circuits. Prerequisite EET 101 or equivalent. **Course Fee: \$10.00**



EET 110 Electronics Survey I

3 semester credits

An introduction to basic concepts and terminology of electronics for the non-electronics major. Topics start with electricity and continue through everyday commercial and home applications. **Course Fee: \$10.00**

EET 204 Electronic Fundamentals II

4 semester credits

A study of field-effect transistors and circuits, thyristors and circuits, frequency effects on amplifier circuits, and the fundamentals of the operational amplifier and applications circuits. **Course Fee: \$6.00**

EET 205 Communications Fundamentals

4 semester credits

Study of electronic telecommunications systems including radio communications, amplitude modulation and sideband systems and application circuits, frequency and phase modulation systems and circuits. Prerequisites: EET 101 and EET 103. **Course Fee: \$9.00**

EET 206 Electronics Equipment Design & Fabrication

4 semester credits

A hands-on course focusing on the construction of electronics equipment. The course will include the principles of circuit and chassis fabrication of packaging for electronic equipment, the techniques of layout, construction, finishing, assembly, wiring and harnessing, and the proper use of tools and hardware. The student will be introduced to several different types of shop tools and hand tools. Printed circuit board layout and design using computer aided design software will be included. A number of direct and photographic circuit board fabrication techniques will be presented. A project is used by each student to develop skills for each process. Prerequisite: DRFT 156.

EET 207 Digital Fundamentals

5 semester credits

A course designed for electronic majors covering digital system basics. Topics covered include: number systems and codes, logic gates, Boolean algebra, digital IC's, multivibrators, combinatorial logic, registers and counters, memories, and microprocessor fundamentals. **Course Fee: \$6.00**

EET 279 Cooperative Education

1, 3, 6 or 12 semester credits

A planned and supervised work-learning experience in industry, business, government, or community service agencies related to University program of study. Prerequisites: Two semesters of attendance at Montana State University-Northern, approval of advisor, Chair/Dean of the College of Technical Sciences, and cooperative education coordinator. Pass/Fail only.

EET 304 Network Circuit Analysis

3 semester credits

A study of DC and AC circuits using mesh and nodal analysis, source free RL and RC, RLC circuits, unit step forcing function, sinusoidal forcing function, phasors, sinusoidal steady state response, complex frequency, frequency response, Fourier analysis, Fourier transforms, and LaPlace transforms. Prerequisites: EET 204 and MATH 133.

EET 305 Digital Systems

3 semester credits

This course involves an introduction to programmable logic devices and an in-depth study of a selected micro controller system. **Course Fee: \$9.00**

EET 307 Communications Circuits

4 semester credits

This course provides a study of electronic telecommunication circuits, which includes communications techniques, digital communication theory, circuits, and transmission and network communications. Prerequisite: EET 205. **Course Fee: \$6.00**

EET 308 Industrial Electronics

4 semester credits

This course focuses on basic power circuits and machines. Topics include power distribution systems, DC and AC motors, power control circuits, transducers, and industrial process control. **Course Fee: \$9.00**

EET 311 Analog IC's

4 semester credits

This course provides a study of integrated circuits in the applications of voltage amplifiers, Norton amplifiers, instrumentation amplifiers, voltage and current regulation, active filters and phase locked loops. **Course Fee: \$6.00**

EET 401 Interfacing

3 semester credits

The course focuses on the student's education and experience on specific technical projects. Students will complete individual projects and then integrate the individual projects into a group project. Emphasis is placed on research, construction, testing, and presentation of individual and group projects based on developing interfacing circuits for a selected micro controller system. During the course the

student will submit formally written reports and give public explanations and demonstrations of the projects. This course meets the general education requirement for a capstone course. Prerequisites: EET 305 and senior standing. **Course Fee: \$12.00**

EET 430 Advanced Communications Systems

3 semester credits

This course provides an advanced study of communications systems and circuits. Topics include FM circuits, antennas, transmission lines, and cellular and microwave systems.

Course Fee: \$12.00

EET 450 Advanced Digital Systems

3 semester credits

This course provides an advanced study of selected digital systems. Topics include mass storage devices, memory systems, bus architecture, and local area networks. **Course Fee: \$12.00**

EET 479 Cooperative Education

1, 3, 6 or 12 semester credits

A planned and supervised work-learning experience extending the student's experience in industry, business, government, or community service agencies related to the University program of study. Prerequisites: two semesters of attendance at Montana State University-Northern, approval of advisor, college chair/interim dean, and cooperative education coordinator. Pass/Fail only.

ENGLISH



ENGL 111 Written Communication I

3 semester credits

Writing from observation, personal experience, and research, for narrative, descriptive, expository, and persuasive purposes. Emphasizes strategies for development of ideas, organization, revision, and editing applicable to any writing task. Six or more completed papers will be required.

ENGL 112 Written Communication II

3 semester credits

Emphasizes argumentation and research writing. Students will write at least six essays and a significant research paper including a thorough bibliography. Students will be introduced to library research methods, the avoidance of plagiarism, and formal documentation. Prerequisite: ENGL 111 or HON 111.

HON 115 Honors Written Communication I

3 semester credits

This course will typically seek a thematic focus different from the standard ENGL 111. This focus will be developed by the instructor and approved by the honors committee. Work in this class typically includes writing from observation, personal experience, and research, for narrative, descriptive, expository, and persuasive purposes. This course emphasizes strategies for development of ideas, organization, revision, and editing applicable to any writing task. Six or more completed papers will be required. Prerequisite: Acceptance in the honors sequence.

ENGL 116 Newspaper Practicum I

3 semester credits

This course provides experience in any of the range of activities (from reporting and photography to layout and editing) required to produce a student newspaper. By arrangement with the instructor, each student will undertake an individualized student newspaper project. This course may be repeated for credit two times. Prerequisite: None

HON 212 Honors Written Communication II

3 semester credits

This course will typically seek a thematic focus different from the standard ENGL 112. This focus will be developed by the instructor and approved by the honors committee. The course continues the study of the modes of composition introduced in ENGL 111. The course emphasizes argumentation and research writing. Students will write at least six essays and a bibliography. Students will be introduced to library research methods, the avoidance of plagiarism, and formal documentation. Prerequisite: Acceptance in the honors sequence.

ENGL 114 Introduction to Literature

3 semester credits

Study of three of the major literary forms (fiction, poetry, and drama), including examples of each from several periods. Selections will include works by and about minorities and women.

ENGL 201 American Literature I

3 semester credits

A survey of American literature from the colonial period to 1870.

ENGL 202 American Literature II

3 semester credits

A survey of American literature from 1870 to the present.

ENGL 214 Introduction to World Literature

3 semester credits

An historical and thematic study of world literature in translation that may include Babylonian, Hebrew, Indian, Chinese, Persian, and other literature.

ENGL 218 Journalism

3 semester credits

Analysis of the print news media, including introduction to reporting and writing the news and to newspaper production; practice in writing news, editorials, and features.

ENGL 221 English Literature I

3 semester credits

A survey of English literature from the Old English Period to 1700.

ENGL 222 English Literature II

3 semester credits

A survey of English literature of the eighteenth, nineteenth, and twentieth centuries. Readings include works by the Augustans, the Romantics, the Victorians, the moderns, and the contemporary writers of Great Britain.

ENGL 305 Advanced Essay Writing

3 semester credits

Practice in expository writing for advanced students. Prerequisite: ENGL 112.

ENGL 309 Popular Genres

3 semester credits

An historical and critical approach to popular genres within the discipline that have been defined as including topics of significant aesthetic and sociological value outside the traditional canons of mainstream tradition. Material to be considered will be determined by the instructor and may include such genres as fantasy literature, science fiction, detective fiction, Gothic literature, movies, popular culture, and so on. May be repeated for credit.

ENGL 310/510 Literature for Children and Adolescents

3 semester credits

A study of the literature designed for and available to the pre-adult audience, from pre-school materials for reading preparation and reading aloud, through elementary school literature, to literature for the adolescent audience of the middle school and secondary school levels. Includes poetry, fairy tales, myths, epics, fables, informational and nonfiction works, biographies, popular fiction, and fantasy literature.

ENGL 311 Creative Writing

3 semester credits

Writing poetry and fiction. Study of the techniques of poetry--the creation and use of metre, rhyme, line, stanza, tone and figurative language--and of fiction--development of action, character, and narrative voice.

ENGL 313 Methods of Teaching English

3 semester credits

A study of the theories and methods of teaching English, including study of the theories and methods of teaching creative writing and composition. Concentrates on teaching English at the junior high and senior high school level.

ENGL 316 Newspaper Practicum II

3 semester credits

This course provides experience in any of the range of activities (from reporting and photography to layout and editing) required to produce a student newspaper. By arrangement with the instructor, each student will undertake an individualized student newspaper project. This course may be repeated for credit two times. Prerequisite: Newspaper Practicum I.

ENGL 318 Feature Writing

3 semester credits

Analysis and practice of writing feature news stories.

ENGL 330 Modern Poetry

3 semester credits

A study of the major trends and significant theories of poetry from 1800 to 1945; the Romantic period, the Victorian period, American Poetry and the Modern period.

ENGL 331/NAS 331 Literature by and About Native Americans

3 semester credits

A critical examination of a representative number of major works by non-Native Americans about Native Americans and major works by Native Americans. Topics include stereotyping, segregation, prejudice, and the roles of Native Americans in American society. Readings include mythology, poetry, essays, novels, and non-fiction.

ENGL 337 English Grammar

3 semester credits

A general study of word construction, form, and usage and word groups within sentences.

ENGL 338 Public Relations Writing

3 semester credits

Practice in writing public relations materials such as brochures, background pieces, speeches, newsletters and press releases.

ENGL 349/549 Montana Literature

3 semester credits

A study of the works of major Montana authors as these reflect upon regional experience including works appropriate for a pre-adult audience.

ENGL 360 Survey of Dramatic Literature

3 semester credits

A study of representative plays from Greek, Roman, Medieval, Renaissance, Restoration periods; the 18th, 19th, and 20th centuries, with attention to the cultural and historical factors contributing to the development of these works and analysis of significant ideas, themes, and production techniques.

ENGL 366 Technical Writing and Editing

3 semester credits

Guided practice in the writing and editing of documented technical communications, focusing on the composition, revision, and interpersonal communication skills needed by effective writers and editors. Prerequisite: ENGL 112.

ENGL 368 Writing for Grants

3 semester credits

Guided practice in writing of grant proposals to private foundations or public agencies, with particular attention to the researching of funding sources, program planning, and the appropriate conventions of technical and business writing associated with proposals and progress reports.

ENGL 380/580 Linguistics

3 semester credits

A survey of the scientific developments and major theoretical approaches to the science of oral and written languages.

ENGL 385 Shakespeare

3 semester credits

Introduction to the poetic and dramatic works of Shakespeare. Reading and analysis of representative plays from the comedies, histories, and tragedies and critical assessment of Shakespeare's historical importance in literature and culture from the 16th century to the present.

ENGL 401 Contemporary Literature

3 semester credits

A study of the development of the forms and themes of poetry and fiction in the period since World War II.

ENGL 402 Literary Criticism

3 semester credits

A study of the theories and methods of literary analysis from ancient times to the present, as represented in the works of selected literary theorists and critics.

ENGL 409 Major Writers

3 semester credits

An intensive study of the works of one or more major English or American writers or literary genres from the periods of literary history. The writer or writers to be studied vary at the discretion of the instructor. Prerequisite: Junior standing. May be repeated for credit.

ENGL 435 Development of the Novel

3 semester credits

A study of the development of the novel in England, Europe and the United States from the eighteenth century to the present.

EARTH SCIENCE

ESCI 115 Foundations of Earth Science

4 semester credits

Basic concepts of geology, astronomy, meteorology, and physical geography. Selection of topics will be at the discretion of the instructor. Course includes lecture and laboratory hours. Prerequisite: MATH 120 or placement into MATH 112 or MATH 130. **Course Fee: \$5.00**

ESCI 204 Physical Geology

4 semester credits

Introductory geology emphasizing the physical constitution of the Earth's interior and surface. Prerequisites: MATH 120 or placement into MATH 112 or MATH 130. **Course Fee: \$5.00**

ESCI 206 Historical Geology

4 semester credits

Introductory geology emphasizing the evolution of the Earth and life through geological time. ESCI 204 is recommended. Prerequisites: MATH 120 or placement into MATH 112 or MATH 130. **Course Fee: \$5.00**

ESCI 208 Environmental Geology

4 semester credits

An introduction to such geological phenomena as earthquakes, volcanism, and flooding which influence humans and human civilization. Lecture and laboratory hours are included. Prerequisites: MATH 120 or placement into MATH 112 or MATH 130.

ESCI 307 Astronomy

4 semester credits

Introduction to astronomical observation and measurement and features of the Solar System and phenomena found outside the Solar System. Includes lecture and laboratory hours. Offered alternate years. Prerequisite: PHYS 231.

ESCI 310 Introduction to Paleontology

3 semester credits

This course will provide an introduction to paleontology and the various procedures in the field with special emphasis on Montana and Alberta Fossils. Prerequisite: ESCI 115 or ESCI 204 or consent of instructor. **Course Fee: \$10.00**

ESCI 315 General Hydrology

3 semester credits

An overview of the water cycle with special emphasis on flowing and standing water systems. Offered alternate years.

ESCI 405 Earth Science Investigations for Teachers

3 semester credits

Astronomy, geology, and meteorology for science teachers. Graduate credit requirements are described in the course syllabus. **Course Fee: \$10.00**

ESCI 505 Earth Science Investigations for Teachers

3 semester credits

Astronomy, geology, and meteorology for science teachers. Graduate credit requirements are described in the course syllabus. **Course Fee: \$10.00**

FRENCH

FREN 105 Elementary French

4 semester credits

Introduction to French, emphasizing conversational ability but including reading comprehension and written expression. Extensive use of spoken French in the classroom, small group practice sessions, and individual conferences with the instructor. Students desiring further French study may register for additional credits of French 105. Two semesters of French 105 (8 credits) constitute the first-year University French sequence. Students with prior French study should consult the instructor for placement. No prerequisite for the first semester.

FREN 205 Intermediate French

4 semester credits

Continued and progressive development of the skills acquired in Elementary French and special emphasis on conversational ability, vocabulary building, and the grammar necessary for correct oral and written expression. Extensive pronunciation practice to develop proper syllable division, stress, linking, and intonation. Students desiring further study may register for additional credits of FREN 205. Two semesters of FREN 205 (8 credits) constitute the second-year University French sequence. Prerequisites: Two semesters of elementary French (8 credits) or the equivalent and permission of the Instructor.

FREN 305 Advanced Composition and Conversation

4 semester credits

Advanced work in spoken and written French through compositions and conversations covering the modern French speaking world and the historical development of art, music, literature, philosophy, politics, science, and social institutions in France. Class conducted in French. Students desiring further French study may register for additional credits of French 305. Two semesters of French 305 constitute a third-year University French sequence. Prerequisite: two semesters

of Intermediate French (8 credits) or the equivalent. Prerequisite: Permission of the Instructor.

FRESHMAN SEMINAR

FRSH 100 Freshman Seminar

1 semester credit

The freshman seminar course is designed to provide students with an early introduction to the expectations and challenges of University life, to the procedural, geographic and academic maps of the University, and to the learning strategies and life skills necessary for success. The freshman seminar provides opportunities for students to interact with faculty and administrators as well as peers. Programming includes social events and activities designed to integrate the student into the University environment.

GENERAL STUDIES

GEN 301 Society and Technology

3 semester credits

This upper division course will consider ethical, moral, and philosophical implications of technology. The course will explore the interrelationship of the humanities, science, and technology. The course will consider the benefits as well as the limitations of technology. The course will evaluate alternative technologies and will examine different approaches by different disciplines and cultures to technology. The course will be presented in a lecture, discussion, and lab format through interdisciplinary team teaching. Specific topics may vary from semester to semester. **Course Fee: \$10.00**

GEOGRAPHY

GEOG 119 World Regional Geography

3 semester credits

An introduction to the geography of the major regions of the world, the human communities of those regions, and their relationships to geographic locations, physical environment, population, economic resources, and international politics.

GERMAN

GER 105 Elementary German

4 semester credits

Introduction to German, emphasizing conversational ability but paying appropriate attention to reading comprehension and correct written expression. Extensive use of spoken German in the classroom, small group practice sessions, and individual conferences with the instructor. Students desiring further German study may register for additional credits of German. Two semesters of German 105 (8 credits) constitute the first-year University German sequence. Students with prior German study should consult the instructor for placement. No prerequisite for the first semester.

GRAPHIC DESIGN

GDSN 220 Illustration I

3 semester credits

Studio exercise in observational and imaginative drawing and painting. A variety of media and expressive, narrative, and descriptive techniques are explored in the creation of artwork for commercial reproduction. Prerequisite: ART 120.

GDSN 231 Graphic Design Applications

3 Semester credits

This course is an introduction to software applications used by today's graphic design industry. A workbook-guided approach is employed and the course is self-paced. Photoshop, Illustrator, and QuarkXpress are covered in the course. This course is prerequisite to GDSN 320, GDSN 350 and GDSN 450.

GDSN 232 Electronic Design Applications

3 Semester credits

This course is an introduction to software applications used by today's graphic design industry for electronic media. A workbook-guided approach is employed and the course is self-paced. Dream weaver, Fireworks, and Flash are covered in the course. This course is prerequisite to GDSN 240, GDSN 340, and GDSN 450.

GDSN 240 Electronic Design I

3 Semester credits

This course covers web site design using page creation applications and image editing applications. Prerequisite: GDSN 232.

GDSN 250 Graphic Design I

3 Semester credits

Lecture/Studio course incorporating visual design concepts and techniques in problem-solving of commercial graphic arts assignments. Emphasis on individual creativity in realistic problem-solving situations. Prerequisite: ART 150.

GDSN 270 Introduction to Photography

3 semester credits

Basic introduction to photography. Use of the camera, film, compositional techniques, and fundamental darkroom procedures. **Course Fee: \$25.00**

GDSN 320 Illustration II

3 semester credits

This course covers illustration based in current imaging software with the goal of developing individual methods and style. Prerequisite: GDSN 220 and GDSN 231. **Course Fee: \$10.00**

GDSN 340 Electronic Design II

3 Semester credits

This course covers web site design using page creation applications and image editing applications. Additionally, animation and multimedia will be incorporated into the design process. Prerequisite: GDSN 240.

GDSN 350 Graphic Design II

3 semester credits

Lecture/studio course utilizing visual design concepts and principles in problem-solving of realistic commercial graphic arts assignments. The computer is incorporated as the primary tool for generating images, typography and composition. Prerequisites: CIS 110, GDSN 250, GDSN 231 or permission of instructor. **Course Fee: \$15.00**

GDSN 370 Photography II

3 semester credits

This is a lecture/studio course utilizing visual design concepts and principles in problem-solving of realistic commercial

graphic arts assignments. The computer is incorporated as the primary tool for generating images, typography and composition. Prerequisites: CIS 110, GDSN 231, GDSN 250, or permission of instructor. **Course Fee: \$30.00**

GDSN 450 Graphic Design III

4 semester credits

Lecture/studio course utilizing visual design concepts and principles in problem-solving of realistic commercial graphic arts assignments. The computer is incorporated as the primary tool for generating images, typography, and composition. A portfolio will be constructed and presented at the conclusion of the course. Prerequisites: GDSN 231, GDSN 250, GDSN 350, GDSN 320. **Course Fee: \$15.00**

GENERAL SCIENCE

GSCI 412 Environmental Problems

3 semester credits

Review of major environmental problems facing civilization with the thought that the general awareness of these problems by the citizenry provides an important educational commitment. Such evaluations will be made in the context of basic ecological concepts and principles and will involve integration of various scientific and non-scientific disciplines. Graduate credit requirements are described in the course syllabus.

GSCI 512 Environmental Problems

3 semester credits

Review of major environmental problems facing civilization with the thought that the general awareness of these problems by the citizenry provides an important educational commitment. Such evaluations will be made in the context of basic ecological concepts and principles and will involve integration of various scientific and non-scientific disciplines. Graduate credit requirements are described in the course syllabus.

GSCI 602 History and Philosophy of Science

3 semester credits

Study of prominent scientists in all areas of scientific inquiry, specifically their temperaments and idiosyncrasies, their backgrounds, and their interrelationships with the environmental, social, and political conditions that existed during their lifetimes.

GSCI 621 Integrated Life Science

3 semester credits

Integration of basic concepts from the various physical sciences into the life science discipline using photosynthesis and light as the main focal points. Prerequisites: basic botany and chemistry courses.

GSCI 622 Integrated Physical Science

3 semester credits

Integration of chemistry and physics together with a supplemental integration of the biological and earth sciences in order to achieve better understanding of how the world functions. Computer based laboratory materials and experiments will be developed to assist in understanding the requirements and techniques of scientific pursuit. Prerequisites: basic chemistry and physics courses.

GSCI 631 Integrated Science Principles for Teachers

3 semester credits

A course for science teachers that focuses upon integrating scientific concepts and utilizing available equipment and reagents to produce worthwhile laboratory activities and demonstrations from an integrated perspective. Computers will be used as convenient tools for measuring and calculating experimental data. Prerequisites: basic chemistry, physics, and biology courses.

GSCI 693 Assessment Seminar

2 semester credits

Study of how students learn, emphasizing various evaluation methodologies (e.g., outcome-based assessments) in science education. A review of science education concepts is provided together with considerations of the value that modern insights will ultimately have in improving future science education endeavors.

GSCI 698 Graduate Research

3 or 6 semester credits

Research and investigation into approved topics and problems. The student's Graduate Program Committee must approve the research plan and final product. May be repeated. A limit of 6 credits may be applied to your program.

HISTORY

HIST 101/RRT 101 The History of Railroading

3 semester credits

The history and traditions of railroading and the industry's role in North American economic development.

HIST 131 American History I

3 semester credits

A general survey of the fundamental political, social, economic, cultural, and diplomatic developments that have contributed to the formation of American civilization from the colonial period to 1877.

HIST 132 American History II

3 semester credits

A general survey of the fundamental political, social, economic, cultural, and diplomatic developments that have contributed to the formation of American civilization from 1877 to the present.

HIST 141 History of Civilization I

3 semester credits

This course is a survey of the various civilizations of the world from their ancient origins to 1500. European, Asian, American and African societies will be examined, compared and contrasted at the various stages of their development throughout this period. The course deals with the encounters and interactions among the various civilizations, and examines the political, social, economic, cultural, ideological and technological developments that have shaped the world.

HIST 142 History of Civilization II

3 semester credits

This course is a survey of the various world civilizations from 1500 to the present. The civilizations of Europe, Asia,

America and Africa will be examined, compared and contrasted at the various stages of their development throughout this period. The course deals with the encounters and interactions among the various civilizations, and examines the political, social, economic, cultural, ideological and technological developments that have shaped the civilizations of the world.

HIST 216 Montana History

3 semester credits

A study of the major political, social, cultural, and economic developments that have contributed to the formation of Montana and to Montana's place within the region, the nation, and the world, from prehistoric times to the present.

HIST 301 Colonial America to Jackson

3 semester credits

An examination of the political, economic, social, and cultural conditions of America from 1600 through 1828, concentrating on the factors that led to the American Revolution and the establishment of the nation as a democratic republic.

HIST 302 Ante-Bellum America Through Reconstruction

3 semester credits

An examination of the economic, social, political, and cultural conditions that from 1828 through 1877 led to economic disaster, massive expansion, the Civil War, the abolition of slavery, and Reconstruction.

HIST 303 Populist/Progressive Era through the Depression

3 semester credits

An examination of the period between the official end of Reconstruction (1877) and the outbreak of World War II (1941), the most dynamic period of American development and disaster, concentrating on social, economic, and cultural changes.

HIST 305 World War II through the Present

3 semester credits

Study of the period between the outbreak of World War II (1941) and the present, concentrating on that war, the Korean conflict, the Cold War, Vietnam, the nuclear age, the space age, and the effects of those major events and developments on domestic politics, culture, and the American economy.

HIST 310 American Westward Expansion

3 semester credits

Examination of the social, political, economic, and cultural aspects of American westward expansion from the eastern seaboard to California and Alaska, with emphasis on the importance of the frontier in the development of the American character.

HIST/ECON 346 Business and Economic History of the United States

3 semester credits

Students will study the growth and development of the U.S. Economy and business transformation from colonial times to the mid-20th century. The central organizing focus concerns the economic, cultural, and constitutional incentive structures in America that have motivated entrepreneurship and

efficient resource use. A background in basic economics or business theory is useful but not required.

HIST 354 History of Technology and Transportation

3 semester credits

A study of the history of technology and transportation and their development from the early modern era to our contemporary world, stressing the interrelationships between technology and transportation. Attention is given to the interaction of economic, technological, and cultural factors as a stimulus to the development of technology and the transportation system.

HIST 364/NAS 364 History of American Indians

3 semester credits

History of American Indians from Pre-Columbian times to the present, with special emphasis on demographic shifts caused by encroaching European and American westward expansion, and relationships between Native Americans and immigrants.

HIST 374 Intellectual History of Western Civilization

3 semester credits

This course offers a survey of the development of ideas from the ancient Hebrew and Greco-Roman cultures through the Middle Ages, Renaissance, Scientific Revolution, and Enlightenment to the Modern Era. Students will read, discuss, and write about primary sources authored by such thinkers as Aristotle, Cicero, Locke, Adam Smith, Burke, Wollstonecraft, Toqueville, Comte, Darwin, Marx, Spencer, Mill, Nietzsche, Freud, Rocco, and Sartre, and will explore concepts such as Humanism, Liberalism, Positivism, Socialism, Fascism, and Existentialism.

HIST 449 Historiography

3 semester credits (**capstone course**)

Students will examine and analyze the work of historians as examples of the technique and procedure of writing history. Capstone course for Broadfield Social Science majors. Prerequisite: Senior standing

HEALTH AND PHYSICAL EDUCATION ACTIVITIES

HPEA 10X Intercollegiate Varsity Participation

Courses in this series reflect participation in varsity athletics and may be repeated up to four times.

HPEA 100 Intercollegiate Men's Wrestling

1 semester credit

HPEA 101 Intercollegiate Men's Basketball

1 semester credit

HPEA 102 Intercollegiate Women's Basketball

1 semester credit

HPEA 103 Intercollegiate Women's Soccer

1 semester credit

HPEA 104 Intercollegiate Men's Football

1 semester credit

HPEA 105 Intercollegiate Women's Volleyball

1 semester credit

HPEA 106 Intercollegiate Cheerleading

1 semester credit

HPEA 107 Intercollegiate Women's Golf

1 semester credit

HPEA 108 Intercollegiate Rodeo

1 semester credit

HPEA 109 Selected Topics in Intercollegiate Participation

1 semester credit

HPEA 13X Intercollegiate Recreational Skills

Courses contained in this area will be reflective of activities generally regarded as recreation and can be individual, dual, or group in nature.

HPEA 130 Tennis

1 semester credit

HPEA 131 Billiards

1 semester credit **Course Fee: \$10.00**

HPEA 132 Archery

1 semester credit

HPEA 133 Racquetball

1 semester credit **Course Fee: \$30.00**

HPEA 134 Recreational Activities

1 semester credit

HPEA 135 Frisbee

1 semester credit

HPEA 136 Golf

1 semester credit **Course Fee: \$20.00**

HPEA 137 Badminton

1 semester credit

HPEA 138 Bowling

1 semester credit **Course Fee: \$15.00**

HPEA 139 Selected Topics in Recreational Skills

1 semester credit

HPEA 15X Aquatic Skills

These courses are designed to teach aquatic activities, which will provide lifetime skills, safety skills, and training skills for instructors of aquatic activities.

HPEA 150 Beginning Swimming
1 semester credit **Course Fee: \$5.00**

HPEA 151 Intermediate Swimming
1 semester credit **Course Fee: \$5.00**

HPEA 152 Skin and Scuba Diving
1 semester credit

HPEA 153 Canoeing
1 semester credit

HPEA 154 Aqua Exercise
1 semester credit

HPEA 159 Selected Topics in Aquatic Skills
1 semester credit

HPEA 16X Team Sports
Courses contained in this area will include those activities found to be reflective of what is generally considered team sports.

HPEA 160 Soccer
1 semester credit

HPEA 161 Volleyball
1 semester credit

HPEA 162 Floor Hockey
1 semester credit

HPEA 163 Basketball
1 semester credit

HPEA 164 Softball
1 semester credit

HPEA 165 Touch Football
1 semester credit

HPEA 166 Team Handball
1 semester credit

HPEA 167 Wallyball
1 semester credit **Course Fee: \$30.00**

HPEA 169 Selected Topics in Team Sports
1 semester credit

HPEA 17X Outdoor Skills
Courses contained in this area will include those activities which take place in the outdoors and can be given lifelong consideration.

HPEA 170 Alpine Skiing
1 semester credit **Course Fee: \$50.00**

HPEA 171 Cross Country Skiing
1 semester credit **Course Fee: \$10.00**

HPEA 172 Wilderness Camping
1 semester credit **Course Fee: \$5.00**

HPEA 173 Rock Climbing
1 semester credit

HPEA 179 Selected Topics in Outdoor Skills
1 semester credit

HPEA 18X Fitness and Wellness Skills
These courses are designed to teach lifetime activities which will promote fitness and wellness for a healthy lifestyle.

HPEA 180 Weight Control
1 semester credit

HPEA 181 Weight Training
1 semester credit

HPEA 182 Aerobic Dance
1 semester credit

HPEA 183 Personal Self Defense
1 semester credit

HPEA 184 Trimmastics
1 semester credit

HPEA 185 Conditioning Activities
1 semester credit

HPEA 186 Yoga
1 semester credit

HPEA 187 Advanced Weight Training
1 semester credit
Prerequisite: HPEA 181

HPEA 189 Selected Topics in Fitness and Wellness Skills
1 semester credit

HPEA 19X Rhythmics and Dance Skills
Courses in this series will provide the student an opportunity to develop skills in the areas of elementary dance, folk and social dance, square dance, modern dance, contemporary dance, and gymnastics and tumbling.

HPEA 191 Folk Dance
1 semester credit

HPEA 192 Social Dance
1 semester credit

HPEA 194 Square Dance
1 semester credit

HPEA 195 Modern Dance
1 semester credit

HPEA 197 Gymnastics and Tumbling

1 semester credit

HPEA 198 Selected Topics in Rhythmics and Dance

1 semester credit

HEALTH AND PHYSICAL EDUCATION

HPE 215 Basic Athletic Taping

1 semester credit

Practical experience in learning basic athletic taping techniques. Some injury evaluation and exercise rehabilitation included. **Course Fee: \$15.00**

HPE 231 Individual and Team Sports

3 semester credits

This course is designed to give physical education majors and minors an opportunity to plan and teach a variety of individual and team sports, to be determined by the Health and Physical Education program faculty. Emphasis placed on skills development, skills progression, and evaluation of motor performance. **Course Fee: \$7.00**

HPE 233 Foundations of Health and Physical Education

2 semester credits

Designed to acquaint the prospective physical education teacher with broad concepts of health, physical education, and recreation including the historical development of modern programs, philosophies, and their application to physical education.

HPE 234 First Aid and CPR

2 semester credits

A course designed to provide the student with the latest approved first aid and CPR procedures. **Course Fee: \$8.00**

HPE 235 Principles of Health Education & Substance Abuse

3 semester credits

This course is an introduction to the basic and new concepts of health. Topics included will be nutrition, physical fitness, stress management, substance abuse, HIV/AIDS, safety and risk management, as well as wellness components of emotional, physical, social, intellectual, and spiritual health. This course is required for all pre-education majors to fulfill OPE certification requirements, and is a program requirement for Health Promotion majors and minors. It is also appropriate for pre-nursing majors and those interested in taking a proactive approach to their lives and health.

HPE 236 Intramural and Recreational Activities

3 semester credits

A course designed to teach leadership, basic skills, rules, and techniques for various recreational games. Practical student experiences in directing all phases involved within an ongoing intramural program; scheduling, league organization, publicity, and team point computations.

HPE 247 Techniques of Officiating

3 semester credits

Rules, techniques, and mechanics of proper sports officiating. The major sports of football, basketball, and baseball will be

covered, along with additional sports selected by the Health and Physical Education program faculty.

HPE 248 Foundations of Coaching

3 semester credits

An introductory course encompassing the general duties and responsibilities of coaches in all sports including philosophy, organization, administration, and supervision.

HPE 250 Life Guard Training

2 semester credits

This course includes the American Red Cross requirements for Life Guard Training and additional lifesaving techniques. Prerequisite skills include: Tread water for 2 minutes using legs only. Swim 500 meters continuously using each of 4 basic strokes and retrieve a submerged 10 lb. object from seven feet. **Course Fee: \$6.00**

HPE 251 Water Safety Instruction

2 semester credits

This course includes the American Red Cross requirements for Water Safety Instruction and additional teaching and administrative techniques. Prerequisite skills include: Swim 50 yards using each of four basic strokes. Swim 10 meters of butterfly, perform a standing front dive, and perform a throwing assist with buoy. **Course Fee: \$6.00**

HPE 274 Personal and Community Health

3 semester credits

Evaluation of personal health in relation to the services available throughout a community. Application to K-12 teachers for coordinating/utilizing community services in a health enhancement curriculum.

HPE 279 Cooperative Education

1, 3, 6 or 12 semester credits

A planned and supervised work-learning experience in industry, business, government, or community service agencies related to the University program of study. Prerequisites: Two semesters of attendance at Montana State University-Northern, approval of advisor, Chair/Dean of the College of Education, and cooperative education coordinator.

HPE 300 Physical Education in the Elementary School

3 semester credits

This is an exploration of teaching skills and strategies for elementary physical education. Topics covered include selection, practice, and application of games and activities to aid in developing skills, fitness, and attitudes and appreciation for physical activity by the elementary school age child (K-6). Personal and educational values for the teacher candidate will be incorporated throughout. Curriculum development and selections is also discussed. Prerequisite: Admission to Teacher Education, EDUC 321 Integrating Technology into Education and EDUC 300 Introduction to Curriculum Planning and Practice.

HPE 305 Methods and Materials in Health Education

3 semester credits

This is an introduction to resources and methods used to teach health. The course will cover, extensively, the Health Enhancement Curriculum Model and Health Enhancement

Curriculum Standards released by OPI to familiarize students with the requirements of all K-12 teachers in the state of Montana. Prerequisite: Admission to Teacher Education, EDUC 321 Integrating Technology into Education, and EDUC 300 Introduction to Curriculum Planning and Practice; Health Promotion majors/minors: Admission made by formal application-waiver to College of Education.
Course Fee: \$10.00

HPE 306 Adapted Physical Education

2 semester credits

This course is a study of the diverse and complex nature of disabilities and the role of physical education for the handicapped. Organizing and administering programs for students with special needs, selection of methods used in assessment and evaluation, lesson development, implementation and evaluation are covered. A 20-hour field experience is required, working with individuals with developmental and physical handicaps. Prerequisite: Admission to Teacher Education, EDUC 321 Integrating Technology into Education, and EDUC 300 Introduction to Curriculum Planning and Practice.

HPE 307 Community Recreation

3 semester credits

Study of community recreation programs with regard to their activities, organization, administration, leadership, planning, special problems, and evaluation. Practical student experiences within an ongoing intramural program may also be included.

HPE 325 Organization & Administration of Health & Physical Education

3 semester credits

Organizing and administering the modern health and physical education program. Areas covered will include utilization and design of facilities, budget development, marketing, programming, risk and safety management, athletics, program and personnel evaluation, and equipment.

HPE 340 Coaching Football

2 semester credits

A study of training techniques, offensive and defensive strategy, selection of team, methods of conducting practice, and utilization of personnel.

HPE 341 Coaching Basketball

2 semester credits

A study of training techniques, offensive and defensive strategy, selection of team, methods of conducting practice, and utilization of personnel.

HPE 342 Coaching Track & Field

2 semester credits

A study of training techniques, strategy, selection of team, methods of conducting practice, and utilization of personnel.

HPE 343 Coaching Volleyball

2 semester credits

A study of training techniques, offensive and defensive strategy, selection of team, methods of conducting practice, and utilization of personnel.

HPE 344 Coaching Wrestling

2 semester credits

A study of training techniques, selection of team, methods of conducting practice, and utilization of personnel.

HPE 345 Coaching Baseball-Softball

2 semester credits

A study of training techniques, offensive and defensive strategy, selection of team, methods of conducting practice, and utilization of personnel.

HPE 346 Coaching Gymnastics

2 semester credits

A study of training techniques, selection of team, methods of conducting practice, and utilization of personnel.

HPE 347 Coaching Swimming

2 semester credits

A study of training techniques, selection of team, methods of conducting practice, and utilization of personnel.

HPE 349 Coaching in Selected Sports

2 semester credits

For a MHSAA approved sport, the course consists of a study of training techniques, offensive and defensive strategy (if appropriate), selection of team, methods of conducting practice, and utilization of personnel.

HPE 358 Physiology of Exercise

3 semester credits

The study of the effects of various exercises on the systems of the body, with implications for the improvement of health, physical fitness, and athletics. Applications of theory to actual situations. Prerequisite: BIOL 204 or BIOL 241.

HPE 359 Teaching Practice in Physical Education

1 semester credit

Student experience in teaching physical education service classes, supervised by University instructor; taken prior to student teaching. May be repeated for credit. Prerequisite: HPE 325.

HPE 362 Biomechanics and Movement Education

4 semester credits

An exploration of movement beginning with developmental movements such as tumbling, rhythmic and low organizational games, progressing through the evaluation and correction of body mechanics. Students will develop an understanding of the principles of lever systems and muscle forces through applied anatomy. Application of theory to teaching and coaching at all developmental levels will be emphasized. Prerequisite: BIOL 204 or 241.

HPE 368 Safety Education

2 semester credits

Study of the basic principles of safety education and their application to the schools.

HPE 370 Prevention and Care of Athletic Injuries

3 semester credits

A study of conditioning and evaluation to prevent injuries; recognition and evaluation of injuries; treatment and rehabilitation of injuries. Additional topics of nutrition,

ergogenic aids, and risk management are included. Lab will involve the application of evaluation and rehabilitation skills as well as the practice of basic taping techniques.
Prerequisite: BIOL 241.

HPE 374 Current Issues in Health

3 semester credits

Study of current health issues that affect present populations: the environment, drug and alcohol, AIDS, diseases of lifestyle, health care and insurance, and birth control. To include prevention and/or control, solution, and implications.

HPE 376 Tests & Measurements in Health and Physical Education

2 semester credits

Administration, analysis, interpretation, and valuation of tests in health and physical education.

HPE 378 Sex Education

3 semester credits

A study of the biological and behavioral values as it concerns human sexuality.

HPE 386 Drug and Alcohol Education

2 semester credits

Introductory information for prospective teachers on the nature and effects of drug and alcohol abuse, social and personal needs of users, rehabilitation techniques, and legal regulations of drug possession and use.

HPE 394 Outdoor Education

3 semester credits

Introduction to the concept of outdoor education and its relationship to physical education; includes basic outdoor skills and the safety requirements involved. **Course Fee: \$8.00**

HPE 407 Issues in Competitive Athletics

3 semester credits

A study of individual administrative, supervisory, and organizational problems directly related to athletics as they affect the coach, athletic director, or profession.

HPE 423 Marriage and Family Relationships

3 semester credits

An in-depth study and discussion of courtship, love, marriage, problem solving, and family relationships. Human relations and values clarification are emphasized through the group process.

HPE 448 Psychology and Sociology in Sports

3 semester credits

A study of psychological and sociological implications of sports participation.

HPE 479 Cooperative Education

1, 3, 6 or 12 semester credits

A planned and supervised work-learning experience in education, business, government, or community service agencies related to the University program of study.
Prerequisites: Junior standing and approval of advisor, Chair/Dean of the College of Education, and cooperative education coordinator. Pass/Fail only.

HONORS

HON 115 Honors Written Communication I

3 semester credits

This course will typically seek a thematic focus different from the standard ENGL 111. This focus will be developed by the instructor and approved by the honors committee.

Work in this class typically includes writing from observation, personal experience, and research, for narrative, descriptive, expository, and persuasive purposes. This course emphasizes strategies for development of ideas, organization, revision, and editing applicable to any writing task. Six or more completed papers will be required. Prerequisite: Acceptance in the honors sequence.

HON 113 Honors College Algebra

3 semester credits

Properties and theorems of the real and complex number systems. Study of the function concept, including inverse functions, graphing techniques, linear, quadratic, polynomial, exponential, and logarithmic functions. Solving systems of equations in two or more variables using matrices, determinants, and matrix algebra. This course must satisfy the core requirements of MATH 112, as determined by the mathematics faculty. The course will have a focus beyond the standard MATH 112. That focus will be developed by the instructor and approved by the Honors Committee.
Prerequisites: Placement by means of ACT scores or University placement examination or consent of instructor, and acceptance in Honors sequence.

HON 212 Honors Written Communication II

3 semester credits

This course will typically seek a thematic focus different from the standard ENGL 112. This focus will be developed by the instructor and approved by the honors committee. The course continues the study of the modes of composition introduced in ENGL 111. The course emphasizes argumentation and research writing. Students will write at least six essays and a bibliography. Students will be introduced to library research methods, the avoidance of plagiarism, and formal documentation. Prerequisite: Acceptance in the honors sequence.

HUMANITIES

HUM 201 Introduction to the Humanities

3 semester credits

A survey of the humanistic disciplines: literature, philosophy, music, art, architecture, and theater designed to help students identify those qualities that make each discipline unique and to discover commonalities among these disciplines.

HUM 279 Cooperative Education

1, 3, 6 or 12 semester credits

A planned and supervised work-learning experience in industry, business, government, or community service agencies related to the University program of study.
Prerequisites: Two semesters of attendance at Montana State University-Northern, approval of advisor, Chair/Dean of the College of Arts and Sciences, and cooperative education coordinator.

HUM 479 Cooperative Education

1, 3, 6 or 12 semester credits

A planned and supervised work-learning experience extending the student's learning experience in industry, business, government, or community service agencies related to the University program of study. Prerequisites: Cooperative Education 279 or Junior standing and approval of advisor, Chair/Dean of the College of Arts and Sciences, and cooperative education coordinator. Pass/Fail only.

INDUSTRIAL AND ENGINEERING TECHNOLOGY

IET 100 Introduction to Industrial & Engineering Technology

3 semester credits

This course is a survey course designed to familiarize students with the educational requirements, talents, and responsibilities for careers related to industrial and engineering technology. The content of this course should provide the framework for materials to be presented in future math, science, industrial, and engineering technology courses. **Course Fee: \$6.00**

IET 480 Senior Project I

1 semester credit

This course is the proposal phase for a program faculty-approved technical project. Emphasis is placed on library research, design, specification, cost analysis, and project management. The student will submit a formal written report and give a public explanation of the project. This course meets part of the general education requirements for a capstone course. Prerequisites: Senior standing and advisor consent. **Course Fee: \$2.00**

IET 481 Senior Project II

2 semester credits

This course is the implementation phase for a program approved-technical project. Emphasis is placed on construction, design, testing, and formal presentation. The student will submit a formal written report and give a public explanation and demonstration of the project. The student will furnish all necessary materials. This course completes the general education requirements for a capstone course. Prerequisites: Senior standing and advisor consent, IET 480. **Course Fee: \$10.00**

INTERDISCIPLINARY STUDIES

IDST 401 Interdisciplinary Seminar

3 semester credits

A seminar in which students will investigate how forms of philosophical, literary, artistic, scientific, and technological achievements both reflect and shape our society. Subject matter may be drawn from intellectual and technical responses to a particular societal issue or problem. Prerequisites: HUM 201 and Senior standing..

INDUSTRIAL TECHNOLOGY

IT 110 Production Technology

3 semester credits

This is a course designed to give the student an overview of production processes. The main focus of the course will be

on secondary processes and their role in an industrial environment. The lecture time will concentrate on industrial processing. Laboratory activities will simulate industrial processes to involve the student in the major categories of forming, separating, fabricating, conditioning, and finishing.

IT 120 Communications Technology

3 semester credits

This course will familiarize students with the educational requirements, talents, and responsibilities for careers-related technology. An overview of program planning, employment trends, technical developments, license requirements and future trends in the various programs are provided. Special emphasis is given to the communication of technical information. Students will demonstrate subject competencies through both individual and group activities. Topics covered also include ethical and environmental issues related to technology.

IT 130 Construction Technology

3 semester credits

This course provides a study of contemporary principles and practices used in the construction industry with emphasis on the techniques used for interior and exterior building construction. Civil construction is also covered. Activities may include construction of a scale model or a community construction project.

IT 210 Energy/Power Technology

3 semester credits

This course will examine energy sources, power generation, power transmission and control systems, resistance, power measurement, and devices that provide mechanical force. This course will concentrate on applications of electrical, electronic, mechanical, and fluid power systems as they apply to the manufacturing, communications, and construction industries.

LEARNING EXPERIENCE ASSESSMENT PROGRAM

LEAP 289

1 semester credit

Students will develop a portfolio documenting their work and life experiences for evaluation for possible college credit which may used to meet degree requirements. Detailed policies and procedures governing the LEAP program may be found in the [university policies and procedures manual](#) at www.msun.edu.

MATH FOR APPLIED SCIENCE

MAAS 106

3 semester credits

This course is intended for AAS-degree students enrolled in vocational programs who are not planning to transfer to other degree programs or institutions. It is a basic mathematics course for developing mathematics skills through introductory algebra as they relate to technical programs. This course includes measurement systems, use of measuring tools, as well as development of area and volume concepts with respect to technical applications. This course may not be used to meet general education requirements for Math for the Associate of Science, Associate of Arts, or Baccalaureate degree programs.

MONTANA ADMINISTRATION OF SCHOOLS

MAS 104 Student Activity Programs

1 semester credit

Student Activity Programs is a one (1) credit workshop covering school activities. This workshop will cover topics such as school policy for activities, extracurricular fund accounting, handling the money, bookkeeping responsibilities, and reporting functions. One of the guidebooks for this seminar is the Student Activities Fund Manual published by the Montana Association of School Business Officials.

MAS 105 Pupil Transportation

1 semester credit

Pupil transportation is a one (1)-credit workshop that addresses school bus policies and transportation. The course covers the basic rules as defined in Montana Code 20-10. The course presents the definition of terms as provided in the Code as well as bus requirements, driver requirements, penalties, bus contracts, bids, duties of various entities, service areas, mileage, and reimbursement.

MAS 106 Food Services

1 semester credit

Food Services is a one (1) credit workshop to acquaint students with the fundamental laws relating to a school food service. The workshop will cover definitions, administration, record keeping, Federal Funding and the Food Services Fund.

MAS 107 School Safety

1 semester credit

School Safety is a one (1) credit workshop designed to present the basic topics of a safety program for a school. It discusses the idea of an accident free, safe work/school environment for all people involved in school activities. It presents the topics of policy, management, awareness, hazard recognition, and reporting.

MAS 108 Retirement System

1 semester credit

This one (1) credit workshop is a quick overview of the Montana Public Employees Retirement System. The course uses the Montana Public Employees Retirement System Handbook as a guide for the course. Supplemental information and updates will be presented in the course as well. Topic headings as provided in the handbook provide the basis for class activities. The handbook is published by the Public Employees Retirement Board.

MAS 130 Public Sector Ethics

3 semester credits

This course examines the values in the public sector that lead to organizational ethics. The clarification of values, value consensus, and value compliance are some of the topics covered in the course. The course uses various examples from all levels of government to emphasize value principles. The presentation is from the viewpoint of the individual administrator and draws on both the cultural standpoint and the functional standpoint.

MAS 268 School Law I

3 semester credits

This course teaches the legal requirements for schools as outlined in Section 20 the the Montana Code. The course brings awareness to the student of the legal forces affecting today's schools. This understanding will allow the student to grasp many of the daily issues that influence decision making in the school. The major headings for the laws are: General Provisions, State Boards and Commissions, Elected Officials, Teachers, Superintendents, and Principals, Pupils, School Districts, and School Instruction and Special programs.

MAS 269 School Law II

3 semester credits

School Law II is an introductory course on school financing as presented in Montana Code 20-9. It is intended to bring a rudimentary understanding of the major topics in school finance to those who may be responsible for handling the paperwork required for state reporting. The course covers topics such as: budgets, bonds, special purpose funds, grants, special levies, fund accounting and the administration of the above topics.

MATHEMATICS

STUDENT ENROLLMENT IN MATH 110, 112, 120, AND 125 IS CONTINGENT UPON SUCCESSFUL COMPLETION OF THE NECESSARY PREREQUISITE(S).



MATH 094 Developmental Math I

Basic math course for developing mathematics skills through introductory algebra. Placement is by means of ACT scores or university placement examination Pass/Fail only.

PLEASE NOTE: Students who successfully complete this course will not receive credits toward graduation; the grade earned in the class is not included in the student's grade point average. Three (3) credits are included in determining fees and financial aid eligibility, however. For a more complete description of a class with an OXX number, students should refer to page 17 of this catalog under the "course numbering system".



MATH 095 Developmental Math II

A basic mathematics course for developing and re-enforcing math skills through intermediate algebra. Prerequisite: MATH 094 or placement by means of ACT scores or university placement examination. Pass/Fail only.

PLEASE NOTE: Students who successfully complete this course will not receive credits toward graduation; the grade earned in the class is not included in the student's grade point average. Three (3) credits are included in determining fees and financial aid eligibility, however. For a more complete description of a class with an OXX number, students should refer to page 17 of this catalog under the "course numbering system".

MATH 110 Math for Liberal Arts

4 semester credits

Survey of a wide variety of topics including sets and logic, mathematical patterns, number systems, number theory, algebra, geometry, probability and statistics. The development of problem-solving skills is emphasized. Prerequisite: MATH 094, MATH 095, or placement by means of ACT scores or university placement examination.

MATH 112 College Algebra

3 semester credits

Properties and theorems of the real and complex number systems. Study of the function concept including inverse functions, graphing techniques, linear, quadratic, polynomial, exponential, and logarithmic functions. Solving systems of equations in two or more variables using matrices, determinants, and matrix algebra. Prerequisite: MATH 095 or placement by means of ACT scores or university placement examination. **Course Fee: \$3.00**

HON 113 Honors College Algebra

3 semester credits

Properties and theorems of the real and complex number systems. Study of the function concept, including inverse functions, graphing techniques, linear, quadratic, polynomial, exponential, and logarithmic functions. Solving systems of equations in two or more variables using matrices, determinants, and matrix algebra. This course must satisfy the core requirements of MATH 112, as determined by the mathematics faculty. The course will have a focus beyond the standard MATH 112. That focus will be developed by the instructor and approved by the Honors Committee. Prerequisites: Placement by means of ACT scores or University placement examination or consent of instructor, and acceptance in Honors sequence.

MATH 116 Applied Statistics

3 semester credits

Study of statistics from descriptive statistics through regression analysis, correlation, and analysis of variance. Topics are investigated as they apply to real world data. Computers and calculators are used extensively.

MATH 120 Mathematics for Elementary Teachers I

3 semester credits

Topics relating to elementary mathematics education including number systems, probability and algorithms for basic operations. Some algebra is also covered. Prerequisite: MATH 094, MATH 095 or placement by means of ACT scores or university placement examination. **Course Fee: \$5.00**

MATH 121 Mathematics for Elementary Teachers II

3 semester credits

Topics relevant to elementary mathematics education, including algebra, statistics, and number theory. Focuses primarily on geometric concepts. Prerequisite: MATH 120. **Course Fee: \$5.00**

MATH 125 Trigonometry

2 semester credits

Analytic trigonometry including trigonometric and circular functions, solutions of triangles with law of sines/cosines,

solutions of trigonometric equations, identities, graphs, inverse functions, and vectors. Prerequisite: MATH 112.

MATH 130 Pre-Calculus

5 semester credits

Analytic trigonometry including trigonometric and circular functions, solutions of triangles with the law of sines/cosines, trigonometric equations, identities, graphs, inverse functions, vectors; mathematical induction, complex numbers, sequences and series, linear equations, conics, polar coordinates, and parametric equations. Prerequisite: Placement by examination or MATH 112.

MATH 133 Introduction to Calculus

3 semester credits

An intuitive approach to calculus. Differentiation and integration and positive reinforcement of concepts in algebra, trigonometry, and analytic geometry. Prerequisite: MATH 130 or MATH 112. **Course Fee: \$3.00**

MATH 137 Calculus for Technology I

3 semester credits

An introduction to differential and integral calculus with emphasis on practical engineering technology applications. Prerequisites: MATH 130, MATH 133, or consent of instructor.

MATH 138 Calculus for Technology II

3 semester credits

Calculus with emphasis on engineering technology applications. Includes integration, infinite series, and differential equations. Prerequisite: MATH 137

MATH 140 Probability and Statistics

4 semester credits

Introduction to probability and probability distributions including fundamental principles of descriptive statistics, statistical inference, correlation, regression analysis, and analysis of variance. Prerequisite: MATH 112.

MATH 220 Calculus & Analytic Geometry I

5 semester credits

Developing the concepts of calculus and analytic geometry including rates of change, limits, derivatives and anti-derivatives, concepts of integration, and the application of integration. Prerequisite: MATH 130 or both MATH 112 and MATH 125.

MATH 221 Calculus & Analytic Geometry II

5 semester credits

Further development of the concepts of integration and applications, work with infinite series, plane curves, and parametric vectors and vector valued functions, and partial differentiation. Prerequisite: MATH 220.

MATH 279 Cooperative Education

1, 3, 6 or 12 semester credits

A planned and supervised work-learning experience in industry, business, government, or community service agencies related to the University program of study. Prerequisites: Two semesters of attendance at Montana State University-Northern, approval of advisor, Chair/Dean of the

College of Arts and Sciences, and cooperative education coordinator. Pass/Fail only.

MATH 310 Linear Algebra

3 semester credits

Study of Vector spaces and linear transformations which act on vector spaces, focusing on linear transformations and their matrix representations. Prerequisite: MATH 221.

MATH 317 Methods of Teaching Secondary Mathematics

2 semester credits

Theories and techniques of teaching secondary mathematics. Investigation of methodology of content presentation and practice teaching techniques. Major developments in mathematics curriculum.

MATH 320 Computers in Math Education

3 semester credits

Use of computers in the classroom focusing on software systems in current use in University and public school situations. The software systems studied are used primarily in science and mathematics but are also adapted for use in developing communication skills.

MATH 323 Calculus and Analytic Geometry III

3 semester credits

Introduction to the calculus of several variables including partial derivatives, extremes, tangent planes, multiple integrals, and applications, and vector analysis. Prerequisite: MATH 221.

MATH 326 Differential Equations

3 semester credits

Ordinary differential equations and LaPlace Transforms. Prerequisite: MATH 221.

MATH 330 Abstract Algebra

3 semester credits

Introduction to mathematical groups, rings, fields, and polynomial rings. Prerequisite: MATH 221.

MATH 334 Modern Geometry

3 semester credits

Study of Euclidean Geometry, selected topics from non-Euclidean Geometry. Prerequisite: MATH 221.

MATH 335 Elementary Number Theory

3 semester credits

Selected topics from real number theory and congruencies. Prerequisite: MATH 221.

MATH 410 Numerical Analysis

3 semester credits

Introduction to numerical analysis including error analysis, real roots of equations, numerical integration, and numerical solutions of ordinary differential equations. Prerequisites: MATH 326 and one higher-level computer programming language course.

MATH 430 Seminar in Mathematics

3 semester credits

Holistic view of the mathematics previously the mathematics previously taken by the students. Includes exploration and research in their special interests.

MATH 479 Cooperative Education

1, 3, 6 or 12 semester credits

A planned and supervised work-learning experience in industry, business, government, or community service agencies related to the University program of study. Prerequisites: Cooperative Education 279 or Junior standing, approval of advisor, Dean of the College of Arts and Sciences, and the director of cooperative education. Pass/Fail only.

METALS TECHNOLOGY

METL 125 Automotive Machining and Tool Technology

3 semester credits

An introductory course designed to acquaint the technology student with the tools, equipment, safety practices, and material utilized in a shop setting. Topics studied will include precision measurement and the identification, maintenance, and the safe use of manual and automotive machine tools, including cylinder boring bars, crankshaft grinder, honing machine, thread restoring tools, gear pullers, presses, and etc.

Course Fee: \$8.00



METL 140 Introduction to Welding and Cutting

3 semester credits

An introductory course covering care and use of arc and oxyfuel welding equipment, regulators, torches, cylinders, power sources, electrodes, characteristics of operation, welding of steels and special applications. Introduction to techniques of welding mild steel. Mechanical properties of metals and types of joints are also covered. **Course Fee: \$30.00**

METL 150 Shielded Metal Arc Welding

3 semester credits

A continuation of METL 140, additional training in welding horizontal, vertical, and overhead positions of mild steel. Emphasis is placed on alloys and special applications. Prerequisite: METL 140 or consent of instructor. **Course Fee: \$30.00**

METL 154 Gas Arc Welding Processing

3 semester credits

Setup and operation of equipment and control of welding variables, types of power sources, and characteristics of operation, shielding gases, filler materials, quality assurance, and weld defects in metal arc welding, gas tungsten arc welding and flux cored arc welding. Prerequisite: METL 140 or consent of instructor. **Course Fee: \$30.00**



METL 155 Machining Processes

3 semester credits

An introduction to machining. The student will become familiar with basic theory and operations performed on various manual and automated machine tools. Instruction

includes the selection of speeds and feeds and the identification and conditioning of associated cutting tools.

Course Fee: \$8.00

METL 185 Metal Fabrication

3 semester credits

A study of equipment, metals, and procedures used to design, fabricate, and finish welded projects. Students combine skills of drafting, welding, and problem solving in developing functional projects. Prerequisite: METL 140 or consent of instructor. **Course Fee: \$20.00**

METL 204 Machinery's Handbook

2 semester credits

An orientation to the theory, principles and technical data associated with circles, tolerances, fits, tapers, threads, screw thread measurement, indexing, splines, keys, and keyseats, weights and measures, and metric conversions.

METL 215 Metallurgy and Manufacturing Materials

3 semester credits

A study of metals, their composition, structure properties, and their behavior when exposed to different conditions. This course also deals with failure analysis, destructive and non-destructive testing methods. Ceramics, plastics, adhesives, composites, and wood will be discussed. **Course Fee: \$20.00**

METL 220 Metal Shop Management and Fabrication

3 semester credits

A continuation of METL 185 with emphasis on responsibilities, problems, and leadership skills in a fabrication shop. Students interact with customers concerning design of projects, estimating, ordering supplies, time schedules, assigning tasks, and supervising fabrication personnel. Prerequisite: METL 185. **Course Fee: \$20.00**

METL 255 Foundry and Patternmaking

2 semester credits

This course is designed to explore accepted industrial foundry techniques. Laboratory learning experience and individually directed research will emphasize pattern design and construction, various mold-making processes, and other industrial manufacturing processes. **Course Fee: \$8.00**

METL 260 Repair and Maintenance Welding

3 semester credits

Theory and practice in repair and maintenance of commonly used metals using oxygen fuel, shielded metal arc (SMAW), gas metal arc welding (GMAW), and gas tungsten arc (GTAW) welding processes. Students work on practice exercises and "live" projects.

Prerequisites: METL 140 and METL 215 or consent of instructor. **Course Fee: \$25.00**

METL 265 Introduction to CNC/CAM

3 semester credits

An introduction to automated manufacturing, computer numerical control and computer assisted manufacturing. Instruction will include the programming, editing, setup, and operation of CNC lathes and milling machines. Prerequisite: METL 155 or consent of instructor. **Course Fee: \$8.00**

METL 267 Mass Production

3 semester credits

A survey of mass production procedures associated with the manufacturing and finishing of machined products. Emphasis is placed on design for production, sequence of operations, jig and fixture application, and production organization and management. Work measurement, quality control, and production time analysis are recorded. Turret and tracer lathes, and computer controlled machine tools supported with CAM software, carbide tooling, and tool change systems are utilized or studied. Prerequisite: METL 155 or consent of instructor. **Course Fee: \$8.00**

METL 270 Product Development

4 semester credits

Students will receive machining instruction in the manufacture, repair, or modification of new or existing products, using all available machine tools, tooling, and inspection equipment. Lecture concentrates on unusual setups requiring thought and problem solving. Job shop and prototype work is performed in the lab. Prerequisite: METL 155 or consent of instructor. **Course Fee: \$8.00**

METL 279 Cooperative Education

1, 3, 6 or 12 semester credits

A planned and supervised work-learning experience in industry, business, government or community service agencies related to the program of study. Prerequisites: Two quarters of attendance at University of Montana-Northern, approval of advisor, Chair/Dean of the College of Technical Sciences, and cooperative education coordinator. Pass/Fail only.

METL 285 Welding Certification Procedures I

3 semester credits

Procedures and development of manual skills necessary to perform welds acceptable under a structural welding code. Prerequisite: METL 150 or consent of instructor. **Course Fee: \$20.00**

METL/ART 353 Metal Sculpture

3 semester credits

Metal Sculpture is a lecture studio course which is team taught by art and welding faculty. The course examines phases of the creative process from concept to criticism of the finished form. Both abstract and representational sculpture will be examined with emphasis on welded fabrication. **Course Fee: \$20.00**

METL 356 Welding Certification Procedures II

3 semester credits

Laboratory applications to be taken following METL 285. Prerequisite: METL 285. **Course Fee: \$20.00**

METL 357 Welding Certification Procedures III

3 semester credits

Laboratory applications to be taken following METL 356. Prerequisite: METL 356. **Course Fee: \$20.00**

PLEASE NOTE: Students enrolling in METL courses may pay between \$8 - \$30/class in course fees. Those fees are in addition to tuition and other fees.

MANUFACTURING

MFGT 200 Manufacturing Processes and Materials

3 semester credits

An introduction to the fundamentals of manufacturing. Capabilities, typical applications, advantages, and limitations of material and process selection for manufacturing. **Course Fee: \$10.00**

MFGT 279 Cooperative Education

1, 3, 6 or 12 semester credits

A planned supervised work-learning experience in industry, business, government, or community service agencies related to the University program of study. Prerequisites: Two semesters of attendance at Montana State University-Northern, approval of advisor, chairperson of department, and cooperative education coordinator. Pass/Fail only.

MFGT 308 Industrial Electronics

4 semester credits

This course focuses on basic power circuits and machines. Topics include power distribution systems, DC and AC motors, power control circuits, transducers, and industrial process control. **Course Fee: \$10.00**

MFGT 341 CAD/CAM Applications

3 semester credits

A course in the principles and application of CAD/CAM and CNC technology. Students will solve problems associated with coordinate geometry, data-base exchange, G and M codes. Prerequisites: DRFT 156 and METL 155. **Course Fee: \$5.00**

MFGT 342 CAD/CAM II

3 semester credits

A continuation in the study of G and M codes from MFGT 341 with emphasis in 3 dimensional CAD/CAM tool path definition. Students will use 3 dimensional models to create sweep surfaces, ruled surfaces, projected surfaces, surface revolutions, and Coons surfaces. Prerequisite: MFGT 341. **Course Fee: \$5.00**

MFGT 365 Robotics and Programmable Controllers

3 semester credits

This course provides a study of the planning, development, and control of robotic work cells through considering technical and management factors. Included is hands-on experience with industrial robots. **Course Fee: \$8.00**

MFGT 371 Jigs & Fixtures

3 semester credits

A lab course utilizing previous course work and technical skills. Students will design, draw, plan, prepare, and set up CNC and/or manual machines to produce a custom designed jig, fixture or punch and die to facilitate the production of a product. A job plan will be prepared for the utilization of the tool. Students will also utilize various precision grinding machines to resharpen HSS drill bits, lather, and milling cutters. Carbide insert selection and criteria will be investigated. Prerequisites: METL 155 and METL 270 or permission of instructor.

MFGT 427 Quality Assurance

3 semester credits

Industrial methods of insuring quality in manufacturing through application of codes and standards, sampling techniques, control charts and implementation of a documentable quality assurance program. Prerequisite: MATH 110 or higher.

MFGT 470 Tool Design

3 semester credits

The design and manufacturing of a permanent plastic injection mold. The theory and practices are applicable to polymers as well as metals. Topics covered will include: the injection molding press, plastics identification, volume and shrinkage computation, mold design including parting line selection, ejector pin location, and inserts. Students will investigate Electro Discharge Machining (EDM). Application of knowledge and skills from prerequisite courses is to be expected. Students in this course will design, fabricate, and produce parts from their own mold. Prerequisites include: DRFT 131, METL 155 and METL 270, or permission of instructor.

MFGT 479 Cooperative Education

1, 3, 6 or 12 semester credits

A planned and supervised work-learning experience extending the student's learning experience in industry, business, government, or community service agencies related to the University program of study. Prerequisites: Cooperative Education 279 or Junior standing and approval of advisor, Chair/Dean of the College of Technical Sciences, and cooperative education coordinator. Pass/Fail only.

MUSIC

MUS 101 Introduction to Music History

3 semester credits

Survey of the fundamental elements of the music of Western civilization. Examination of the history of music and musical styles from the Middle Ages through the Romantic period.

MUS 110 Introduction to Music Theory

3 semester credits

Basic theory providing background in the rudiments of music reading and notation. Includes note and rhythmic reading, scales, intervals and triads. No prior music experience is required.

MUS 210 Voice Ensemble

1 semester credit

Designated for students who wish to further their experience in music by participating in small group or ensemble singing. Repertoire will be based on interests and abilities of the group members.. May be repeated up to three times for credit. Prerequisite: consent of the instructor.

MUS 225 Applied Music

1 semester credit

Designed for students who wish to begin or further their experience in vocal or instrumental music. Lessons in piano, voice, or various instruments may be offered privately or in small groups. May be repeated up to three times for credit. Prerequisite: consent of the instructor. **Course Fee: \$10.00**

MUS 301 Music of the Twentieth Century

3 semester credits

A survey of the composers, styles, techniques, trends, and technologies that have shaped the serious music of the 20th century. Prerequisite: MUS 101 or consent of the instructor.

NATIVE AMERICAN STUDIES

NAS 105 Introduction to Native American Language

3 semester credits

Introduction to one of several Native American languages, concentrating on simple conversations and the relationship of language to culture. The particular language to be studied will vary depending on availability of instruction. Taught by Native speakers, two semesters of NAS 105 (six semester credits) will fulfill the Department of Humanities and Social Sciences language requirement.

NAS 220 Introduction to Ethnic Indian Studies

3 semester credits

Interdisciplinary treatment of Native American studies. Provides general background and understanding of American Indian cultures.

NAS 310 Native Cultures of North America

3 semester credits

Background on the extent and diversity of Native American cultural groups in North America, including languages, geographic locations of cultural groups, and the material, spiritual, and artistic cultures of American Indian tribal groups.

NAS 330 American Indian Oral Tradition

3 semester credits

A study of the oral traditions of various American Indian cultures, including examination of Indian language families, oral history traditions, oral literature, ritual and spiritual observances, together with English translations of Indian memoirs, autobiographies, and religious works.

NAS 331/ENGL 331 Literature by and About Native Americans

3 semester credits

A critical and cultural examination of a representative number of major works written about Native Americans by non-Native Americans and major works by Native Americans. Readings include mythology, poetry, essays, novels, and non-fiction.

NAS 350 Indian Law

3 semester credits

Treats the present applications and precedents of Federal Indian law and its historical development, including Indian treaties, tribal sovereignty, jurisdictional disputes, tribal and state powers of taxation, economic and environmental controls, and real property interests.

NAS 364/HIST 364 History of American Indians

3 semester credits

History of American Indians from Pre-Columbian times to the present, with special emphasis on demographic shifts caused by encroaching European and American westward

expansion, and relationships between Native Americans and immigrants.

NATURAL SCIENCES

NSCI 110 Survey of the Natural Sciences

3 semester credits

Introduction to aspects of the Biological, Physical, and Earth Sciences. The biology component emphasizes the structural and functional features of organisms, their classification, and their importance in the environment. The physical science component presents a non-mathematical approach to understanding some of the basic concepts in chemistry and physics. The earth science studies focuses on the interrelationships between geology, paleontology, astronomy, meteorology and oceanography. This course is required for elementary education majors. **Course Fee: \$15.00**

NSCI 201 Essence of Science

3 semester credits

A review of the historical and philosophical progression of science as it evolved, influenced the development of society and has been directed by society. A review of the significant advances in physical, chemical, and biological sciences and the role of mathematics in science. Emphasis on the intricate interrelationships between all the sciences.

NSCI 450 Undergraduate Research I

3 semester credits

Provides the opportunity to perform undergraduate research in a particular science area of interest as selected by the student; the research project will be initiated and completed under the counsel and guidance of departmental staff. Prerequisites: Appropriate science background and Junior standing.

NSCI 451 Undergraduate Research II

3 semester credits

Serves as a continuation of NSCI 450 and affords the option by which to complete a research endeavor in a selected science area. Prerequisite: NSCI 450.

NURSING

NURS 101 Nursing Syntax and Calculation

3 semester credits

Course designed to be presented via computer assisted instruction and modular teaching methods. The content to be mastered will assist the pre-nursing student to gain the background skills needed to interpret medical terminology. The course will also provide the content necessary for the student to apply mathematical concepts to nursing medication administration.

NURS 128 Introduction to Nursing

6 semester credits

Introduces the role of the associate degree nurse as provider of care, manager of care, and member within the discipline. Emphasis is on the role of provider of care and human health needs. The nursing process, critical thinking, clinical decision making, and health promotion are introduced. The course includes a clinical component to focus on application of these concepts. Prerequisite: Admission to the nursing program.

Course Fee: \$25.00

NURS 136 Health Needs and Nursing Practice

6 semester credits

This course continues the development of the role of the associate degree nurse as provider of care. It introduces and explores nursing care of individuals in acute care and long-term care settings with common health care needs. Critical thinking and clinical decision making is the focus as continued acquisition of clinical competencies occurs. Wellness of individuals in the community continues to be addressed. **Course Fee: \$20.00**

NURS 212 Transition to Associate Degree Nursing

3 semester credits

This course facilitates transition of the LPN student into the ASN program. The nursing process, critical thinking, and the clinical decision making process are discussed. Clinical nursing competency is demonstrated. **Course Fee: \$20.00**

NURS 220 Psychiatric Mental Health/Illness

4 semester credits

The process of critical thinking and clinical decision-making concerning individuals with mental health/illness needs is introduced. Concepts explored are therapeutic communication, behavioral and psychopharmacologic interventions. Clinical experiences provide an opportunity to apply theory to practice in institutional and community-based settings. **Course Fee: \$25.00**

NURS 250 Adult Health/Illness Needs I

6 semester credits

This is a theory and practicum course, which utilizes the nursing process in the provider of care role. Clinical activities focus on the application of critical thinking and clinical decision making skills when caring for individuals with complex health/illness needs in acute care settings. **Course Fee: \$25.00**

NURS 251 Maternal-Child Health/Illness Needs

7 semester credits

This is a theory and practicum course, which addresses the health/illness needs of childbearing and child-rearing families. Clinical activities focus on critical thinking and clinical decision making skills in the care of childbearing and child-rearing families in both acute and community-based settings. **Course Fee: \$25.00**

NURS 252 Adult Health/Illness Needs II

6 semester credits

This is a theory and practicum course, which builds on the role of the nurse as provider of care and emphasizes the manager of care role for groups of individuals. Clinical activities focus on critical thinking and clinical decision making skills in the care of individuals with long-term care and rehabilitative needs. **Course Fee: \$25.00**

NURS 253 Adult Health/Illness Needs III

6 semester credits

This is a theory and practicum course focusing on critical thinking and clinical decision making skills in the care of adults with increasingly complex health/illness needs. The transition to the graduate role integrates the roles of the provider of care, manager of care and member within the discipline in an acute care setting. **Course Fee: \$25.00**

NURS 254 Principles of Nursing Practice

1 semester credit

This is a theory course, which addresses the transition of the ASN student into a graduate nurse. Nursing practice standards, beginning management principles and professional issues are discussed. **Course Fee: \$25.00**

NURS 318 Principles of Pharmacology for Nursing

3 semester credits

Elective designed to facilitate nurses' understanding of pharmacological principles associated with medication administration. Use of clinical decision-making process for medication administrations are reviewed and the student's ability to demonstrate knowledge of medication administration for specific patient needs is facilitated.

NURS 321 Theoretical Foundations of Nursing

3 semester credits

Characteristics of nursing practice as a profession are discussed. Interrelationships of the health care delivery system and nursing roles, functions and clinical decision-making are analyzed. Theoretical bases/concepts of nursing practice are examined. Prerequisite: permission of instructor.

NURS 322 Health Assessment

3 semester credits

Student's knowledge and skills in obtaining a comprehensive assessment of individuals across the lifespan are enhanced. Emphasis is on data collection through history-taking and physical examination in the context of family and environment. Prerequisite: permission of the instructor.

NURS 331 Nursing in Diverse Cultures

3 semester credits

This elective course presents cultural concepts and the relationship to health/illness of individuals and families. The focus is on how culture influences nursing roles and clinical decision-making. Prerequisite: Permission of instructor.

NURS 344 Nursing Care of Clients with Complex Needs

3 semester credits

Focus is on nursing care of clients/families with complex health/illness needs. Pathophysiological and psychosocial concepts are related to nursing roles and critical thinking. Prerequisites: NURS 321 and NURS 322

NURS 346 Gerontological Nursing

3 semester credits

Biopsychosocial aspects of aging are explored in this elective course. Health/illness needs of the older adult and the impact of aging on the family and community are evaluated. Focus is on promoting functional ability and quality of life of the older adult. Prerequisite: Permission of the instructor.

NURS 347 Health Education

3 semester credits

Principles of teaching/learning and the nurse's role as health educator are analyzed in this required course.

NURS 440 Leadership and Management

3 semester credits

Principles of leadership, management and organizational concepts are discussed. The nurse's role and functions as coordinator of care for individuals and groups within the health care system are explored. Prerequisite: NURS 321 and NURS 322. Course should be taken at the same time as NURS 441.

NURS 441 Leadership and Management Practicum

3 semester credits

This practicum provides opportunity to apply leadership and management concepts in a health care system. Prerequisite: RN license. Course should be taken at the same time as NURS 440. **Course Fee: \$20.00**

NURS 444 Nursing Research

3 semester credits

Research methods and application to professional nursing practice are investigated. A research paper is developed and presented. Prerequisites: ENGL 112, statistics and/or permission of instructor.

NURS 446 Community Health Nursing

3 semester credits

Nursing concepts and public health sciences are applied to the health of communities. Health promotion, maintenance, education, disease prevention and coordination of care are investigated. Application is on the individual, family and community as a client. Prerequisite: RN license, NURS 321 and NURS 322. Course should be taken at the same time as NURS 447.

NURS 447 Community Health Practicum

3 semester credits

This practicum provides an opportunity to apply the community health nursing concepts. Prerequisite: RN license. Course should be taken at the same time as NURS 446.

Course Fee: \$20.00

NURS 449 Clinical Preceptorship

3 semester credits

This required practicum provides opportunity to explore one or more clinical practice areas. The student develops individual objectives aimed at increasing clinical decision making skills through critical thinking. The student will be under the direction of a BSN nurse, who is competent in the selected clinical area. Prerequisites: RN license, NURS 321 and NURS 322. Course should be taken at the same time as NURS 344. **Course Fee: \$20.00**

PHILOSOPHY

PHIL 200 Introduction to Philosophy

3 semester credits

Introduces the major problems and questions that have concerned philosophic thinkers from classical to modern times. Principal topics include issues of knowledge, truth, personal identity, ethics, justice, freedom, and religious belief, as discussed by such diverse thinkers as Plato, Aristotle, Descartes, Locke, Hume, Kant, Mill, Russell, Sartre, Austin, Rawls, and Rorty.

PHIL 210 Ethics

3 semester credits

Treats the major thinkers in the development of modern ethical concepts. Principal topics include ethical theories of hedonism, self-realization, empiricism, Stoicism, utilitarianism, voluntarism, existentialism, and linguistic analysis. Ethical works discussed include those of Plato, Aristotle, Epictetus, Epicurus, Aquinas, Eckhart, Machiavelli, Hobbes, Spinoza, Hume, Kant, Bentham, Mill, Kierkegaard, Nietzsche, Marx, Dewey, Moore, Sartre, Ayer, Firth, Austin, and Rawls.

PHYSICAL SCIENCE



PHYS 114 Foundations of Physical Science

4 semester credits

An introductory course primarily for non-science majors and students lacking high school physics and chemistry. The course includes principles of chemistry and physics. Non-algebra approach used to study mechanics, heat, fluids, atomic structure, chemical combinations, electricity, and light. **Course Fee: \$10.00**

PHYS 231 Fundamentals of Physics I

3 semester credits

This is a general physics course covering measurement and experimental error, kinematics, dynamics, work and energy, momentum, rotational motion, properties of solids and fluids, thermal physics, properties of ideal gases, kinetic theory, and thermodynamics. Prerequisite: MATH 112 and MATH 125 or equivalent. MATH 125 may be taken concurrently with PHYS 231, but it is highly recommended that it be taken prior to enrollment in PHYS 231. Concurrent enrollment in PHYS 234 is required. Broadfield Science majors must take the 2 credit lab; Technology majors will take the 1 credit lab.

PHYS 232 Fundamentals of Physics II

3 semester credits

A general physics course covering properties of periodic motion, properties of waves, properties of light, geometric optics, optical instruments, wave optics and electric charge, electric field, electric potential, capacitance, electric current, resistance, magnetism, electromagnetic induction, alternating-current circuits, relativity and atomic structure. Prerequisite: PHYS 231, MATH 112 and MATH 125. Co requisite: PHYS 235. Broadfield Science majors must take 2 credits lab; Technology majors will take the 1 credit lab.

PHYS 234 Fundamentals of Physics I Lab

1 or 2 semester credits

This laboratory course will include experiments related to work and mechanical energy, properties of sound and properties of thermodynamics. Co requisite: Enrollment in PHYS 231. Broadfield Science majors enroll in 2 credits; Technology majors enroll in 1 credit lab. **Course Fee: \$10.00**

PHYS 235 Fundamentals of Physics II Lab

1 or 2 semester credits

This laboratory course will include experiments related to the properties of light, electricity and atomic structure. Co requisite: Enrollment in PHYS 231. Broadfield Science majors enroll in 2 credits; Technology majors enroll in 1 credit lab. **Course Fee: \$10.00**

POLITICAL SCIENCE

POL 134 American Government

3 semester credits

Study of the American federal republic and political system. Focuses on the constitutional structure, limits and operation of the federal government, protection of individual rights, federal-state relations, political processes, and dynamic changes in the government system over time.

POL 201 State and Local Government

3 semester credits

Introductory study of state and local government, including constitutions, legislatures, supreme courts, governors' administrative agencies in their historic and contemporary settings. County and city governments are included in the scope of this course.

POL 235 Political Ideologies

3 semester credits

Introduction to such modern political ideologies as Classical Liberalism, Democratic and Totalitarian Socialism, Conservatism, Fascist Totalitarianism, and Environmentalism. Focuses on the nature of ideological thinking, the logic and internal structures of various ideologies, and their effects in practice.

POL 303 American Constitution

3 semester credits

A study of the origin and development of the American Constitution including the separation of powers, the Executive, Legislative, and Judicial branches of government.

POL 344 International Relations

3 semester credits

A study of the principal forces, movements, ideologies, and instruments of international politics. Prerequisite: consent of the instructor.

POL/ECON 348 Public Choice and the Public Interest

3 semester credits

This is a study of political economy focusing on what modern public choice and public interest models say about the proper boundaries of the public and private sectors. It analyzes the rent-seeking activities of special interest groups and the relative impacts of altruism and self-interest in explaining political behavior and governmental policies in democratic systems. The material focuses on the nature of public goods, market failures, government regulation, and wealth redistribution, among other topics. Theoretical, historical, and empirical forms of evidence are brought to bear on the issues.

POL 401 Seminar in Political Science

3 semester credits

Student participation in the examination of contemporary political ideologies. Contemporary issues in political science, including the structures of political parties, are discussed. Prerequisite: Junior standing.

PSYCHOLOGY

PSYC 101 Introduction to Psychology

3 semester credits

An introductory survey of the scientific discipline of psychology. Attention will be given to such standard topics as the nature of empirical, scientific research, and the learning process, intelligence, perception, personality, motivation, emotion, cognitive processes, abnormal behavior, human sexuality, psi-phenomena, major systems of psychotherapy, human growth and development, psychobiology and physiology, social psychology, memory, stress, forensic and industrial psychology. Students will be guided towards an appreciation of the six major theoretical perspectives that psychology has to offer. As psychology is intended to describe, predict, understand, and to control behavior, students should emerge from the course with an increased degree of enlightened control over their lives.

PSYC 205 Human Growth and Development

3 semester credits

Human development is the study of how and why people change over time, as well as how and why they remain the same. Thus, this course will provide an overview of what is empirically known about all the periods of life from conception to death of our physical vehicles. We shall examine what is known scientifically about physical, cognitive, and psychosocial development in humans. We shall examine how changes in each one of these major areas impacts change in each of the other two. The relative importance of nature and nurture will be examined for each of the various life stages. The issues of native temperament and physical appearance will be given special emphasis as these areas impact psychosocial and cognitive development. A considerable amount of time will be devoted to what is known about methods of effective/ineffective, successful/unsuccessful parenting. Finally, we shall look at the physical, cognitive, and psychosocial aspects of our final years of life. And we shall cap off the course with a careful examination of the research knowledge on near-death experiences.

PSYC 315 Psychology of Development and Adjustment

3 semester credits

In this course students will study the developmental process from conception to death in light of the changes/challenges that each individual will face throughout his/her life. Adjustment will be studied in light of coping strategies and therapeutic interventions. Maladjustment will be examined in light of the DSM-4. Sequences and patterns of psychological and social development are emphasized.

PSYC 360 Personality

3 semester credits

A survey course examining major theories of personality development and change. Particular attention will be paid to the impact of lifestyle upon brain biochemistry, and to the major "trait" approaches to assessing and understanding human personality. The causes, treatment, and prevention of severe shyness will be accorded special attention.

PSYC 461 Abnormal Psychology

3 semester credits

This course will survey the psychotic, neurotic, and life adjustment disorder/diseases to which humankind is subject, as outlined by DSM-4. Each problem area will be analyzed as to its etiology, behavioral symptomology, and viable therapeutic modalities. Emphasis will be placed on the biological underpinnings of behavioral pathology, and upon the ways whereby such underpinnings influence social learning and environmental experiences. Additional emphasis will be placed on classical and operant conditioning as these processes relate to the development of counterproductive, abnormal behavior patterns. The course will also examine the impact of lifestyle (including thinking style) upon brain biochemistry. Finally, the course will examine several of the major theories (and related research) of personality. The etiology, treatment, and prevention of severe shyness will be accorded special attention.

PSYC 515 Psychology of Development and Adjustment

3 semester credits

In this course the student will study the developmental process from conception to death in light of the changes/challenges that each individual will face throughout his/her life. Adjustment will be studied in light of coping strategies and therapeutic interventions. Maladjustment will be examined in light of the DSM-4. Sequences and patterns of psychological and social development are emphasized. Graduate credit requirements are described in the course syllabus.

PSYC 560 Personality

3 semester credits

A survey course examining major theories of personality development and change. Particular attention will be paid to the impact of lifestyle upon brain biochemistry, and to the major "trait" approaches to assessing and understanding human personality. The causes, treatment, and prevention of severe shyness will be accorded special attention. Graduate credit requirements are described in the course syllabus.

PSYC 561 Abnormal Psychology

3 semester credits

This course will survey the psychotic, neurotic, and life adjustment disorder/diseases to which humankind is subject, as outlined by DSM-4. Each problem area will be analyzed as to its etiology, behavioral symptomology, and viable therapeutic modalities. Emphasis will be placed on the biological underpinnings of behavioral pathology, and upon the ways whereby such underpinnings influence social learning and environmental experiences. Additional emphasis will be placed on classical and operant conditioning as these processes relate to the development of counterproductive, abnormal behavior patterns. The course will also examine the impact of lifestyle (including thinking style) upon brain biochemistry. Finally, the course will examine several of the major theories (and related research) of personality. The etiology, treatment, and prevention of severe shyness will be accorded special attention. Graduate credit requirements are described in the course syllabus.

RAILROAD MAINTENANCE & OPERATION

RRT 101/HIST 101 The History of Railroading

3 semester credits

The history and traditions of railroading and the industry's role in North American economic development.

RRT 102 Railroad Technical Crafts

3 semester credits

This course includes information about technical careers in railroading, enabling students to choose suitable career paths. This course includes field trips that will demonstrate the relationships among technical work groups in day-to-day railroad operations.

RRT 201 Railroad Operations

3 semester credits

This course includes information about the industry, its major assets, structure, and typical operations.

RRT 202 Railroad Safety, Environment & Quality

3 semester credits

This course covers the importance of safety, quality, personal health, and environment awareness to the railroad industry and emphasizes the basic tools and techniques for improving these conditions on the job.

SMALL BUSINESS MANAGEMENT

SBM 338 Promotion

3 semester credits

The course will build a strong foundation in the primary skills of advertising, public relations, direct marketing, and promotional techniques. These skills will be related to such topics as forecasting, budgeting, and assessing promotional efficiency. Developing a promotional campaign and the related components of costs, creativity, ethics, and regulations will also be incorporated.

SBM 402 Small Business Management

3 semester credits

Practical analysis of principles of small business management and owner-operated businesses are covered including management methods, location decision making, financial support for startups, marketing management, common administration and control problems, and analysis of trends, professional practices, and family applications. Prerequisites: BUS 300 and BUS 335.

SBM 416 New Venture Development

3 semester credits

An introduction to the subjects of background research, financial analysis and business plan development necessary for the start of a new business or venture. Analysis of entrepreneurial skills, the formation of the venture management teams, and dealing with venture capital sources are also covered in the course. Prerequisite: Senior standing or permission of instructor.

SOCIOLOGY

SOC 101 Introduction to Sociology

3 semester credits

Study of the concepts and principles of group behavior and of the impact which society has upon the programming of the mind and thought processes. Analysis of the components of culture and of the structure of society, as well as social organization and differentiation will also be emphasized. Introduces the essentials of micro sociology and macro sociology.

SOC 102 Social Problems

3 semester credits

A study of the antecedent causes and consequences of such major social problems as violent crime, drug abuse, alcoholism, family violence, divorce, the population explosion, war, maltreatment of the aged, juvenile vandalism, unplanned pregnancy, sexual deviance, riot behavior, religious cults and zealous fundamentalism, are provided with a sociological perspective. Key sociological theories (e.g., interactionism, functionalism, and conflict) are critically examined. Prerequisite or co-requisite: SOC 101.

SOC 240 Social Psychology

3 semester credits

Comprehensive survey of social psychology as an interdisciplinary field of inquiry. Incorporates such standard social psychology topics as socialization, communication and language, perception and beauty, attitude and attitude change, norms, social order and conformity, roles and the ways they shape personality, situational influences on behavior, interpersonal attraction, aggression and conflict, conflict resolution, group behavior and gender roles.

SOC 245 Criminology

3 semester credits

Examination of the various sociological, psychological, and biological theories that purport to explain criminal behavior.

SOC 255 Sociology of the Family

3 semester credits

In-depth examination of the roles of the social institutions known as courtship, marriage, family, and divorce and the interrelationship among these and such other social institutions as work, education, religion, and the political system.

SOC 315 Race, Gender and Ethnic Relations

3 semester credits

Provide knowledge and understanding of such major minority groups as Native Americans, Chicanos, Puerto Ricans, Cuban Americans, Chinese Americans, Japanese Americans, Jews, and women. Some attention will also be devoted to various nationality groups that suffered severe prejudice and discrimination during earlier decades of American history. Various theoretical and research perspectives pertaining to prejudice and discrimination will be examined.

SOCIAL SCIENCES

SOSC 201 Introduction to the Social Sciences

3 semester credits

A systematic and comparative study of the interrelationships among the traditional social sciences (i.e., anthropology, economics, geography, history, political science, psychology, and sociology), together with a review of the most important social science individuals and their major works.

SOSC 279 Cooperative Education

1, 3, 6 or 12 semester credits

A planned and supervised work-learning experience in industry, business, government, or community service agencies related to the University program of study. Prerequisites: Two semester of attendance at Montana State University-Northern, approval of advisor, Chair/Dean of the College of Arts and Sciences, and cooperative education coordinator. Pass/Fail only.

SOSC 325 Methods of Teaching History and Social Sciences

3 semester credits

A study of the theories and practices employed in teaching history and the social sciences on the secondary level. Prerequisites: A minimum of 15 semester hours in history and the social sciences, and Junior standing.

SOSC 479 Cooperative Education

1,3, 6 or 12 semester credits

A planned and supervised work-learning experience extending the student's learning experience in industry, business, government, or community service agencies related to the University program of study. Prerequisites: Cooperative Education 279, or Junior standing and approval of the advisor, Chair/Dean of the College of Arts and Sciences, and cooperative education coordinator. Pass/Fail only.

SPANISH

SPAN 105 Elementary Spanish I

4 semester credits

Introduction to Spanish, emphasizing conversational ability but paying appropriate attention to reading comprehension and correct written expression. Extensive use of spoken Spanish in the classroom, small group practice sessions, and individual conferences with the instructor. Students desiring further Spanish study may register for additional credits of Spanish. Two semesters of Spanish 105 (8 semester credits) constitute the first year University Spanish sequence. Students with prior Spanish study should consult the instructor for placement.

SPAN 106 Elementary Spanish II

4 semester credits

Elementary Spanish II is a continuation of Elementary Spanish I emphasizing conversational ability but paying appropriate attention to reading comprehension and correct written expression. Extensive use of spoken Spanish in the classroom, small group practice sessions, and individual conferences with the instructor will be features of this course.

Prerequisite SPAN 105. Two semesters of Spanish 106 (8 semester credits) constitute the second year University Spanish sequence. Students with prior Spanish study should consult the instructor for placement.

SPEECH



SPCH 141 Fundamentals of Speech

3 semester credits

A study and utilization of the principles and techniques of oral communication. Problems of research, preparation, content, organization, argument, and delivery are examined.

SPCH 142 Interpersonal Communication

3 semester credits

A study of the theory and application of verbal and nonverbal communication as they occur in relatively unstructured person-to-person settings.

SPCH 240 Small Group Communication

3 semester credits

An introduction to the theory and practice of purposeful leadership and participation in group, committee, conference, and public discussion. A focus of this course will include analysis and participation in small groups, how small groups function and an examination of conflict management in small groups. Group interaction will focus on a service learning activity that has outreach components.

SPCH 310 Organizational Communication

3 semester credits

This course features the study of the communication process in an organizational society. This study includes an examination of contrasting theories of organization. The class will also examine the role of communication in different types of organizational structures, the impact of organizational culture and performance, and the nature of communication on different levels within the organization. Particular attention will be paid to the constituting nature of communication in contemporary organizations.

SPCH 320 Communication Theory

3 semester credits

Examination of the current state of representative theorizing about communication. Includes a summary of communication theories and examination of the root assumptions, conceptualizations, and explanatory power of the major theories of the nature of communication.

SPCH 485 Special Topics in Communication

3 semester credits

Topics of special interest as announced in the "Schedule of Classes". May be repeated for credit if there is no duplication of topics.

TECHNOLOGY

TECH 100 Industrial Safety/Waste Management

2 semester credits

A course designed to familiarize the student with proper safety practices and procedures. Course content will include protective clothing, handling of hazardous materials, OSHA regulations, workman's compensation, and first aid. Also, safe practices in using hand and power tools, scaffolds and

ladders, chains and cables, compressed gasses, proper storage of tools and chemicals, and handling of hazardous waste will also be addressed. **Course Fee: \$8.00**

TRANSITIONAL STUDIES

TRST 102 Study Skills

1 semester credit

Introduction to methods of approaching basic study skills in University designed for students who feel they need help with basic study habits to be successful. Emphasis is placed on strategies for test taking, memory, time management, textbook mastery, tapping creativity and exploring individual learning styles in order to achieve personal goals.

TRST 103 Transitional Life/Career Exploration

1 semester credit

This course is designed to assist the student in decision making and career development skills. Through interactive coursework and a variety of evaluative mechanisms, the student will explore career options as well as career "fitness" and the academic preparation/expectations necessary to achieve success in a chosen field in order to design an individualized plan of action to meet academic and career goals. The course is designed to be a "first step" to success for the new University student.

TECHNICAL SCIENCE

TSCI 110 Introduction to Water and Wastewater

4 semester credits

Introduction to drinking water and sewerage/wastewater treatment systems. Topics include plant layout, process control, distribution and collection systems, federal and state regulations, facultative lagoons, and industrial treatment processes and laboratory procedures.

TSCI 205 Distribution Systems

3 semester credits

Introduction to the topics included on the Montana State Examination. Laboratory experience in basic mechanical and plumbing skills, identification, selection, operation, maintenance and repair of hardware and piping systems, and safety procedures commonly used by water or wastewater treatment plants.

TSCI 206 Applied Water Hydraulics

3 semester credits

Applied hydraulics including study of water and wastewater collection and distribution, maintenance, and safety. Includes lecture and laboratory hours.

TSCI 230 Introduction to Groundwater Concepts

3 semester credits

An introduction to the basic concepts governing groundwater including geology, chemistry, contamination, contaminant transport, and remediation techniques. Attention will be focused on the use of groundwater as a source for municipal supply. Includes some laboratory applications.

TSCI 231 Wastewater Processes

3 semester credits

An introduction to industrial and municipal wastewater treatment and preliminary, primary, and tertiary treatment

processes and methods. Specific topics covered include characteristics of wastewater, sampling and testing procedures for wastewater analysis, sludge treatment and disposal, activated sludge process control, legal aspects of sewage disposal, chlorination records and report keeping, maintenance and operation, and safety. Concurrent enrollment in TSCI 232 is required. Prerequisites: TSCI 110, CHEM 111, and MATH 112.

TSCI 232 Wastewater Processes Laboratory

2 semester credits

Laboratory and on-site activities associated with wastewater treatment and analysis. Concurrent enrollment in TSCI 231 is required. **Course Fee: \$20.00**

TSCI 233 Water Treatment Processes

3 semester credits

Water treatment processes including collection and distribution, sedimentation, filtration, chlorination, softening, aeration, fluoridation, corrosion and odor control, maintenance water bacteriology and chemistry, and basic hydraulics and electricity. Concurrent enrollment in TSCI 234 is required. Prerequisite: TSCI 231.

TSCI 234 Water Treatment Processes Laboratory

2 semester credits

Laboratory and on-site activities associated with water treatment processes and water analysis. Concurrent enrollment in TSCI 233 is required. **Course Fee: \$20.00**

TSCI 279 Cooperative Education

1, 3, 6 or 12 semester credits

A planned and supervised work-learning experience in industry, business, government, or community service agencies related to water quality studies. Prerequisites: TSCI 111, two semesters of attendance at MSU-Northern, approval of advisor, Chair/Dean of the College of Arts and Sciences, and cooperative education coordinator. Includes lecture and laboratory hours. Pass/Fail only.

TSCI 304 Fuels and Lubricants

3 semester credits

Petroleum products and their application to the fuel and lubricating requirements of automotive and diesel vehicles. Laboratory tests related to octane, distillation, volatility, viscosity, carbon residue, API degree, and dropping point of greases. Chemical analysis will be made by gas chromatography and infrared. Includes lecture and laboratory hours. **Course Fee: \$15.00**

TSCI 320 Environmental Analytical Techniques

2 semester credits

Focuses upon the chemical, physical, and biological analytical techniques that are commonly used in performing environmental health and water quality assessments, and involves extensive field and laboratory work. Offered alternate years. Prerequisite: basic chemistry course. **Course Fee: \$15.00**

TSCI 415 Pollution Prevention

3 semester credits

An in-depth examination of the process of systematically developing and implementing a pollution prevention program, focusing on developing an awareness of technology

applications which have potentially harmful environmental impacts. Case studies and field experience are included such as Decision Support Systems and Water Quality Models

TSCI 420 Applied Water Quality Technology

3 semester credits

Computer techniques utilized for the acquisition of data, the handling of data generated, methods of data evaluation including statistical evaluation and data presentation used in the water quality profession. Includes introduction to methods of determining water rates, fees, and amortization of capital costs necessary to operate a water utility.

TSCI 479 Cooperative Education

1, 3, 6 or 12 semester credits

A planned and supervised work-learning experience extending the student's learning experience in industry, business, government, or community service agencies related to water quality studies. Prerequisites: Cooperative Education 279 or Junior standing and approval of advisor, Chair/Dean of the College of Arts and Sciences, and cooperative education coordinator. Pass/Fail only.

TECHNICAL SALES AND SERVICE

TSS 222 Customer Service

3 semester credits

The course is designed to be a first exposure to the ideas of identifying and fulfilling customer needs. It leads the students through steps on getting to know the customer, developing a customer report card, examining customer satisfaction through customer eyes versus company eyes, and building a customer satisfaction measuring system.

TSS 246 Technical Sales and Service

3 semester credits

The purpose of this course is to acquaint the student with the sales methods available for the professional sales arena and to develop the framework for preparing professional sales plans. The students will work their way through basic one-on-one small item sales to counter sales, to retail floor sales, to single item industrial sales, to multi-item industrial sales. An emphasis will be put on fast moving technology that requires detailed specifications in sales activities.

TSS 248 Retail/Distributorship

3 semester credits

This course addresses issues that would be of concern to a person interested in a retail career as an owner, a manager of an enterprise, or an employee looking to the future. Such topics as organizing and financing, location decisions, merchandise and expense planning, inventory management, pricing, materials handling, design and layout, and promotions will be discussed. Part of the course will focus on the distributorship as a special form of retail franchising.

TSS 336 Sales and Sales Management

3 semester credits

The course will provide a strong foundation in professional selling and sales management. The course will introduce such topics as: Developing a Personal Sales Philosophy, Developing a Product Strategy, Developing a Customer Strategy, and Developing a Professional Presentation. The course will also introduce the concepts of sales management

and address such topics as management of the sales force, personal productivity, and the ethical aspects of personal selling.

TSS 370 Technology, Innovation, and Management

3 semester credits

The course presents a management perspective on the development and continuation of technology and innovation. This is done through the examination of various theories, past and present readings, and case studies. The course addresses four wide areas: what a manager must know to integrate technology and strategy, the internal and external forces that determine the evolution of technology strategy, the issues of implementing a technology strategy, and innovation challenges for established firms.

TSS 408 Technical Sales Seminar

3 semester credits

This is a senior level class requiring application of previous course work dealing with marketing and sales. The course will use detailed, in-depth analysis of popular case studies. Students will be expected to present legitimate resolutions to chosen case problems as individuals and as members of an analysis team.

VOCATIONAL EDUCATION

VOED 350 Principles of Industrial/Technology Education

3 semester credits

An introductory course designed for the industrial technology student to provide a survey and appreciation for the social and economic values of all forms of education in a democratic society. Major areas of inquiry will center around program requirements, historical development, career opportunities, methods of organizing and advising youth groups, and the major academic clusters of the degree, i.e., energy power transportation, production technology, communication technology, and construction technology.

VOED 360 Analysis & Prep Lab Management

3 semester credits

This course will provide the student the opportunity to gain an understanding of the basic industrial materials and design applications that form the foundation of our technological society and environment. The course will also provide the 5-12 technology education teacher with information related to effective planning, organizing and controlling of technology facilities.

VOED 370 Methods of Teaching Industrial/Technology Education

3 semester credits

This course is designed to develop skills in teaching industrial technology education. The course will provide a study of the curriculum materials and techniques needed for effective instruction. Prerequisites: Admission to Teacher Education, EDUC 321 Integrating Technology into Education, and EDUC 300 Introduction to Curriculum Planning and Practice.

VOED 550 Principles of Industrial/Technology Education

3 semester credits

An introductory course designed for the industrial technology student to provide a survey and appreciation for the social and economic values of all forms of education in a democratic society. Major areas of inquiry will center around program requirements, historical development, career opportunities, methods of organizing and advising youth groups, and the major academic clusters of the degree, i.e., energy power transportation, production technology, communication technology, and construction technology. Graduate credit requirements are described in the course syllabus.

VOED 560 Analysis & Prep Lab Management

3 semester credits

This course will provide the student the opportunity to gain an understanding of the basic industrial materials and design applications that form the foundation of our technological society and environment. The course will also provide the 5-12 technology education teacher Graduate credit requirements are described in the course syllabus.

VOED 570 Methods of Teaching Industrial/Technology Education

3 semester credits

This course is designed to develop skills in teaching industrial technology education. The course will provide a study of the curriculum materials and techniques needed for effective instruction. Prerequisites: Admission to Teacher Education, EDUC 521 Integrating Technology into Education, and EDUC 500 Introduction to Curriculum Planning and Practice. Graduate credit requirements are described in the course syllabus.

VOED 605 Coordination of Cooperative Programs

2 semester credits

Organization, administration, and supervision of cooperative programs.

VOED 606 Assessment Techniques in Vocational Education

3 semester credits

Teacher made tests; formal and informal assessment; alternative assessment; the validity, reliability, and methods of making performance type tests.

VOED 608 Curriculum Construction in Vocational Education

2 semester credits

Methods and procedures for determining curriculum content and organization in vocational education.

VOED 613 Research Practicum

3 semester credits

An individualized course designed to provide the student with the opportunity to acquire practical experience in methods of educational research. Will include a study and review of previous research related to the individual's project.

VOED 618 Survey Techniques in Vocational Education

2 semester credits

Techniques for community or area surveys to determine possible needs for types of vocational education programs.

VOED 619 Seminar in Vocational Education

3 semester credits

Contemporary practices that arise in vocational education relative to methods, content, practices, materials and administration of vocational programs.

VOED 621 Productivity and Organized Labor

3 semester credits

The historical development of the labor movement in the United States; factors involved in hiring employees and in determining productivity. Emphasis on major labor disturbances, federal legislation, and personnel.

VOED 622 History and Philosophy in Vocational Education

3 semester credits

Historical and philosophical foundations of Vocational Education and its relationship in the total education program. Emphasis on current issues, historical events, and people that contributed to Vocational Education.

VOED 623 Administration, Supervision, and Evaluation of Vocational Education Programs

3 semester credits

Techniques used in administration, supervision, and evaluation of Vocational Education classes and programs. Emphasis on accountability and improvement of instruction; evaluation techniques for instruction; financial accountability; and sources and levels of administration.

VOED 624 Vocational Education for Students with Special Needs

3 semester credits

Historical and legislative information on students with special needs. Techniques and strategies for assisting students with special needs in Vocational Education. Emphasis on defining students with special needs; techniques, strategies, and methods for curriculum modifications, instruction and assessment; school-to-work transition; and practical suggestions for ensuring success for students.

VOED 625 Legislation and Regulations Governing Vocational Education

2 semester credits

Recent federal and state legislative activities, executive rules, and regulations responsible for the improvement of instruction with an emphasis placed on financing vocational education.

VOED 647 Organizing and Teaching Adult Education

3 semester credits

Methods of organizing, promoting and conducting adult Vocational Education programs. Emphasis placed on how adults learn.

VOED 648 Planning Vocational Education Programs

3 semester credits

Factors involved in planning vocational facilities and programs to meet specific objectives.

VOED 680 Supervised Field Experience in Vocational Education

4 semester credits

An MSU-Northern directed practical experience in schools and/or other public or private institutions wherein the student is provided the opportunity to acquire 200 hours of professional experience in an area other than his/her employment situation.