



Crookston Catalog 2011-2013

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NOTE: Courses in this catalog PDF are current as of June 2011. For the most up-to-date listing of courses, visit the catalog website at <http://onestop2.umn.edu/courses/designators.jsp?campus=UMNCR>.

Course Numbers

- 0xxx**....Courses that do not carry credit toward any University degree.
- 1xxx**.....Courses primarily for undergraduate students in their first year of study.
- 2xxx**.....Courses primarily for undergraduate students in their second year of study.
- 3xxx**.....Courses primarily for undergraduate students in their third year of study.
- 4xxx**Courses primarily for undergraduate students in their fourth year of study.
- 5xxx**.....Courses primarily for graduate students; undergraduate students in their third or fourth year may enroll in such courses.

Term Offered

A notation following course prerequisites indicates what term the course is offered (fall, spring, May session, or summer), and whether the course is offered every year, or in even or odd years. Abbreviations in parentheses following a course name indicate the university that offers the course:

- UMTC**University of Minnesota, Twin Cities
- NDSU**.....North Dakota State University

Accounting (ACCT)

- ACCT 1803. Directed Studies.** (1-3 cr [max 6 cr]; prereq Instructor consent; fall, spring, every year)
Current topics not covered in regularly offered courses.
- ACCT 2101. Principles of Accounting I.** (3 cr; prereq MATH 1031; fall, spring, every year)
Concepts of accounting cycle, cash, accounts receivable, inventories, plant assets, payroll, partnerships.
- ACCT 2102. Principles of Accounting II.** (3 cr; prereq 2101; fall, spring, every year)
Modern accounting concepts. Cash flow statement. Analysis of financial statements. Management accounting topics, including cost-volume-profit relationships, costing methods, and variance analysis.
- ACCT 3201. Intermediate Accounting I.** (4 cr; prereq 2102; fall, every year)
Financial statements, time value of money, current/long-term assets, intangible assets.
- ACCT 3202. Intermediate Accounting II.** (4 cr; prereq 3201; spring, every year)
Current/long-term liabilities, stockholders' equity, statement of cash flows. Complex financial accounting topics, including leases, pensions, and reporting issues.
- ACCT 3220. Accounting Systems.** (3 cr; prereq 2101; fall, every year)
Theory/methodology of analyzing, designing, implementing accounting information systems. Overview of general ledger software system.
- ACCT 3301. Cost Accounting I.** (3 cr; prereq 2102, composition requirement; fall, every year)
Fundamentals of cost accounting information systems, including cost-volume-profit relationships, costing in service and manufacturing sectors, cost behavior, and budget and variance analysis.
- ACCT 3302. Cost Accounting II.** (3 cr; prereq 3301; spring, every year)
Refinements of cost accounting information systems, including management control systems, cost allocation refinements, capital budgeting, and performance measurement.
- ACCT 3321. Business Law.** (3 cr; prereq Jr; spring, offered when feasible)
Principles of law in American legal system. Contracts, sales, secured transactions, agency law, employment law.
- ACCT 3804. Individual Studies.** (1-3 cr [max 6 cr]; prereq Jr, instructor consent; fall, spring, every year)
Topic related to student's major but not covered in regularly offered courses.
- ACCT 3900. Internship.** (1-3 cr [max 3 cr]; prereq 3202; fall, spring, summer, every year)
Internship in accounting.
- ACCT 4110. Advanced Accounting I.** (3 cr; prereq 3202; fall, odd years)
Accounting for partnerships, combined corporate entities. Consolidated statements.
- ACCT 4111. Advanced Accounting II.** (3 cr; prereq 4110; spring, even years)
Accounting for state and local government and not-for-profit.
- ACCT 4221. Auditing I.** (3 cr; prereq 3202; fall, even years)
Duties/responsibilities of auditor. Audit programs. Liability and professional ethics. Audit reporting standards for independent CPA.
- ACCT 4310. Auditing II.** (3 cr; prereq 4221; spring, odd years)
Auditor's responsibility/liability, ethics, standards of professional conduct, auditing electronic data systems, applying statistical audit techniques.
- ACCT 4404. Income Tax I.** (3 cr; prereq 3202 or instructor consent; fall, every year)
Income tax laws as they relate to individuals.

- ACCT 4405. Income Tax II.** (3 cr; prereq 4404; spring, every year)
Income tax as it affects corporations partnerships, estates, and trusts. May include service-learning component.
- ACCT 4420. Income Tax Preparation.** (2 cr; prereq 4404; spring, every year)
Preparation of actual individual income tax returns for retired and low income taxpayers under Internal Revenue Service Volunteer Taxpayer Assistance Program. Students prepare tax returns during tax season, February 1 to April 15.
- ACCT 4500. Forensic Accounting.** (3 cr; prereq 3202; fall, odd years)
Case studies of accounting fraud, tools to detect fraud and design accounting systems to reduce chance of fraud.
- ACCT 4511. CPA Review Course--Regulation.** (3 cr; prereq 4405; fall, spring, summer, offered when feasible)
Prepares students to sit for the Regulation section of the CPA exam.
- ACCT 4512. CPA Review Course--Financial Reporting and Accounting.** (3 cr; prereq 4111; fall, spring, summer, offered when feasible)
Prepares students to sit for the Financial Reporting and Accounting section of the CPA exam.
- ACCT 4513. CPA Review Course--Auditing and Attestation.** (3 cr; prereq 4310; fall, spring, summer, offered when feasible)
Prepares students to sit for the Auditing and Attestation section of the CPA exam.
- ACCT 4514. CPA Review Course--Business Environment and Concepts.** (3 cr; prereq 3322; fall, spring, summer, offered when feasible)
Prepares students to sit for the Business Environment and Concepts section of the CPA exam.

Aerospace Studies (AS)

- AS 1100. Air Force ROTC Fitness (NDSU).** (1 cr [max 8 cr]; fall, spring, every year)
Benefits of being physically fit, participation in lifetime fitness programs. Achieving/maintaining Air Force and AFROTC fitness standards. Graded version of Enhanced Physical Fitness Training Program.
- AS 1110. The Air Force Today I (NDSU).** (1 cr; A-F or audit; fall, every year)
Introduction to the United States Air Force: its characteristics, missions, organization.
- AS 1120. The Air Force Today II (NDSU).** (1 cr; A-F or audit; spring, every year)
Continuation of AS 1110. Introduction to the United States Air Force: its characteristics, missions, organization.
- AS 2100. Leadership Laboratory (NDSU).** (1 cr [max 4 cr]; S-N only; fall, spring, every year)
Introduction to/application of Air Force customs/courtesies, drill/ceremonies, military commands. Air Force environment. Opportunities for commissioned officers.
- AS 2110. Evolution of USAF Air and Space Power I (NDSU).** (1 cr; fall, every year)
Introduction to Air Force heritage/leaders, Quality Air Force concepts, ethics/values, leadership problems. Applying communication skills.
- AS 2120. Evolution of USAF Air and Space Power II (NDSU).** (1 cr; prereq AS 2110; spring, every year)
Introduction to Air Force heritage/leaders, Quality Air Force concepts, ethics/values, leadership problems. Applying communication skills. Prepares cadets for field training. Continuation of 2110.
- AS 3210. Air Force Leadership/Management I (NDSU).** (3 cr; A-F or audit; fall, every year)
Introduction to management within USAF. Communication skills (oral/written Air Force formats), interpersonal skills, Quality Air Force concepts.

AS 3220. Air Force Leadership/Management II (NDSU). (3 cr; A-F or audit; prereq 3210; spring, every year)
Study of leadership from military perspective. Situational leadership. Contemporary issues, including change management, professional ethics. Officer professional development topics. Case studies. Continuation of 3210.

AS 4100. Leadership Laboratory (NDSU). (1 cr [max 4 cr]; S-N only; fall, spring, every year)
Practical development of leadership skills. Students instruct, supervise, lead junior cadets participating in 2100, perform higher-level management functions within cadet corps organization. Supervised lab.

AS 4410. Preparation for Active Duty I (NDSU). (3 cr; A-F or audit; fall, every year)
National security process, regional studies, advanced leadership ethics, Air Force doctrine, military as profession, officership, military justice, civilian control of military, current issues. Applying communication skills.

AS 4420. Preparation for Active Duty II (NDSU). (3 cr; A-F or audit; prereq 4410; spring, every year)
Military as profession, officership, military justice, civilian control of military, current issues. Applying communication skills. Preparation for new officer's first active-duty assignment. Continuation of 4410.

Agricultural Economics (AGEC)

AGEC 1004. Introduction to Agribusiness. (3 cr; fall, every year)
Background of American agriculture. Interrelationships of agricultural industries. Economic concepts of production, marketing, and consumption. Principles of management. Agricultural policy. Issues/trends in agribusiness.

AGEC 1005. World Agricultural Food Systems. (3 cr; spring, every year)
Historical preferences, consumer trends in diverse geographic regions. How global/national policies affect food trade.

AGEC 1803. Directed Studies. (1-3 cr [max 6 cr]; prereq instructor consent; fall, spring, every year)
Current topics not covered in regularly offered courses.

AGEC 2310. Agribusiness Financial Records. (3 cr; fall, spring, summer, every year)
Applied course in record keeping. Use of computerized system to record business transactions; manage agricultural inventories, receivables, payables, and payroll; and generate coordinated financial statements.

AGEC 2530. Professional Agriselling. (3 cr; A-F or audit; fall, spring, summer, every year)
Use of technical and agricultural knowledge in agricultural sales. Need-satisfaction approach to selling. Planning and conducting informational meetings, exhibiting at farm and trade shows, importance of service and timeliness in agribusiness, and practice in making agrisales presentations.

AGEC 3050. Economics for AgriBusiness Management. (3 cr; A-F or audit; prereq ECON 2101 or instructor consent; spring, every year)
Gathering, organizing, assimilating, applying information applicable to current economic environment. Behavior of individual consumers, resource owners, business firms, market operation in a free enterprise economy. Applying basic economic principles that govern profit. Elements and effects of government policy. Real-world forecasting and planning.

AGEC 3430. Food Marketing Systems. (3 cr; prereq ECON 2101; fall, every year)
Topics include frameworks for analyzing food marketing systems. Marketing institutions, food prices, marketing costs, functional/organizational issues, role of government. Grades/standards. Issues in transportation, storage, and international trade.

AGEC 3540. Farm Business Management. (3 cr; A-F or audit; prereq 2310 or Acct 2102; fall, spring, every year)
Principles of farm accounting. Financial/income statements, cash flow statements, depreciation methods, farm income tax, enterprise analysis, farm management decision making, budgeting/planning, computer analysis of farm business.

AGEC 3640. Agricultural Finance and Valuation. (3 cr; A-F or audit; prereq 2310 or ACCT 2102; spring, every year)
Analysis of investment strategies and financing policies for farm and agribusiness firms. Liquidity, solvency, profitability. Financial documents, legal aspects of credit, financial intermediaries serving agriculture, property valuation, estate planning.

AGEC 3804. Individual Studies. (1-3 cr [max 6 cr]; prereq Jr, instructor consent; fall, spring, every year)
Topic related to student's major not covered in regularly offered courses.

AGEC 4460. International Marketing Problems and Practices. (3 cr; spring, every year)
Problems/practices facing companies in international trade. Import/export regulations, exchange rates, business practices/policies.

AGEC 4740. Grain and Livestock Marketing. (3 cr; fall, spring, every year)
Students develop commodity marketing plan for grain or livestock farming operations. Topics include cash markets, grid pricing, grade premiums/discounts, contracting, crop/livestock insurance, and futures/options.

AGEC 4750. Agribusiness Marketing. (3 cr; prereq 2530 or instructor consent; fall, every year)
Role of marketing in agribusiness. Marketing systems/strategies for competitiveness in a rapidly changing marketplace. Identifying strengths/opportunities to create competitive advantage.

AGEC 4760. Business Plan Development for Agribusiness. (3 cr; =[ENTR 3200]; prereq 4740 or 4750; spring, every year)
Students work with agribusiness firm to assess current situation, future challenges/opportunities. Student teams conduct research, analyze results, formulate marketing plan. Findings/recommendations are presented to the business. Capstone course.

AGEC 4800. Rural Economic Development Practicum. (3 cr)
Students develop strategies/program to promote economic development for a real rural community, including implementation/financing plans.

Agricultural Systems Management (ASM)

ASM 1021. Introduction to Agricultural Systems Management. (2 cr; fall, every year)
Overview of agricultural mechanization systems (engines, machinery, structures, processes).

ASM 1034. Facility Maintenance and Safety. (4 cr; fall, spring, every year)
Safe operation, working environment for power equipment, structures, utilities, metal fabrication.

ASM 1044. Computer-Aided Drafting. (3 cr; fall, spring, every year)
Sketching/dimensioning architectural/landscape projects. Use of CAD program to develop plan views, floor plans, elevations, pictorials, mechanical drawings.

ASM 1333. Agricultural Building Construction. (3 cr)
Selection/application of wood, concrete, steel building materials. Construction techniques using portable, stationary, hand construction tools. Criteria for quality building construction.

ASM 1803. Directed Studies. (1-3 cr [max 6 cr]; fall, spring, every year)
Current topics not covered in regularly offered courses.

ASM 2043. Welding and Manufacturing Processes. (3 cr; fall, spring, every year)
Arc/gas welding of ferrous/nonferrous metals. TIG/MIG welding. Designs for welding, economics, cost estimating. Project design/construction. Basic metal machining.

ASM 2053. Electricity, Controls, and Sensors in Agriculture. (3 cr; spring, every year)
Theory and practical application of electricity and electrical controls in agriculture. Selection/maintenance of electrical motors, heating/light/control devices, and sensors.

Course Abbreviations
Prereqcourse prerequisites
cr.....credit
equivequivalent
fr, soph, jr, srfreshman, sophomore, junior, senior
=Credit will not be granted for the course if credit has been received for the course(s) listed in brackets following this symbol.
,In prerequisite listings, a comma means "and."

A prerequisite course listed by number only (e.g., prereq 3322) is in the same department as the course being described.

Courses beginning with O9 cannot be used for credit toward graduation or transfer.

Course Numbers

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ASM 2200. Introduction to Renewable Energy Systems. (3 cr; spring, every year)

Survey of energy needs as a nation. Changes in world energy demands. Sources of renewable energy. Employment opportunities in bio-fuels, solar, wind, and geo-thermal. Site tours, guest lectures.

ASM 2250. Agricultural Machinery Management. (3 cr; fall, every year)

Mechanical principles. Application of field machinery/power units to varying crop, soil, climatic conditions. Farm management decisions. Introduction to precision agriculture.

ASM 3002. Agricultural Mobile Power Systems. (3 cr; spring, every year)

Selecting, testing, maintaining power units for drawbar, PTO, hydraulic applications. Spark/compression ignition systems, drive trains, DC electrical systems, air conditioning systems.

ASM 3005. Facilities Planning and Selection. (3 cr; =[BM 3005]; prereq 1034, MATH 1031; spring, every year)

Planning facility design. Selecting materials/equipment used in manufacturing and production operations.

ASM 3009. Surveying. (4 cr; fall, every year)

Principles, statistical methods, theory, applications. Measurement of distance, angles, directions using theodolites, electronic distance measurement, transits, total stations. Exercises in leveling, profiling, topographic mapping, traversing, land/construction surveying. Introduction to photogrammetry, GPS, GIS.

ASM 3201. Bio-Fuels Technology. (3 cr; prereq 2200; spring, every year)

Historical development of bio-fuels industry. Chemical/mechanical processes of production in ethanol, bio-diesel, and methane fuels. Economics, current legislation. Site tours, guest lectures.

ASM 3202. Solar, Wind, and Geo-Thermal Systems. (3 cr; prereq 2200; fall, every year)

Historical development of solar, wind, and geo-thermal industries. Mechanical processes of design/utilization of these renewable energy sources. Economics, current legislation. Site tours, guest lectures.

ASM 3360. Applications in Precision Agriculture. (3 cr; prereq ITM 1010, SOIL 1293; fall, every year)

Introduction to applications of precision agriculture. Hands-on practice of mapping fields. Grid sampling techniques. Variable rate applications. Yield mapping/interpretation. Map information.

ASM 3511. Yield Monitoring and Data Interpretation. (1 cr; A-F or audit; prereq ASM 3360; spring, every year)

Calibration of commercially available yield monitoring equipment. Operation fundamentals of various yield sensors. Interfacing sensors, data loggers, global position devices. Saving, storing, retrieving, pooling yield data. Working with data from multiple vendor models/formats. Use of commercially available software to make yield map interpretation.

ASM 3512. Remote Sensing Applications in Precision Agriculture. (1 cr; prereq ASM 3360; spring, every year)

Fundamentals of remote sensing and satellite imaging in monitoring/managing cropping system variability. Applications of commercial mapping and GIS software in processing/interpreting production scale economic variables.

ASM 3513. Precision Farming Data. (1 cr; prereq 3360; spring, every year)

Cropping systems data in precision agriculture. On-farm input/output record keeping, profit analysis using commercial software. On-farm trials/testing of agronomic variables using precision agriculture technologies.

ASM 3804. Individual Studies. (1-3 cr [max 6 cr]; prereq Jr or instructor consent; fall, spring, summer, every year)

Topic related to student's major, not covered in regularly offered courses.

Agricultural, Food, and Environmental Education (AFEE)

AFEE 1001. Intro to Agricultural Education and Extension (UMTC). (1 cr; A-F or audit; fall, spring, every year)

Historical development of agricultural education. Orientation to career opportunities. Areas/expectations of specialization. Issues.

AFEE 1002. Principles of Career Planning for Agricultural Professional (UMTC). (1 cr; A-F or audit; spring, every year)

Self-assessment/analysis of interests, skills, abilities. Analysis of occupations, employment potential, employee expectations. Information interviews to examine career options, employment portfolio.

AFEE 2096. Professional Practicum in Agricultural Education: Early Experience (UMTC). (1 cr; A-F or audit; spring, every year)

Observe schools, extension offices, agricultural-oriented businesses to learn about work/workplace in agricultural education.

AFEE 5111. Agricultural Education: Methods of Teaching (UMTC). (4 cr; fall, every year)

Use of teaching resources. Principles of teaching/learning. Problem-solving techniques, lesson plan construction for large group, small group, individual investigations. Student management. Assessment.

AFEE 5112. Agricultural Education Program Organization and Curriculum for Youth (UMTC). (3 cr [max 4 cr]; spring, every year)

Development of community school program in agriculture, agribusiness, and environmental science that meets graduation outcomes and determines student needs.

AFEE 5114. Agricultural Education Teaching Seminar (UMTC). (1 cr; spring, every year)

Reflective learning on teacher preparation experience. Issues/problems facing the discipline. Needs for continual preparation, program adjustment.

AFEE 5116. Coordination of SAE Programs: Work-Based Learning (UMTC). (2 cr)

Principles/techniques for coordinating work-based learning and supervised agricultural experience (SAE) in agricultural education. Roots of experiential learning integrated with classroom instruction and coordination.

AFEE 5118. Strategies for Managing and Advising the FFA Organization (UMTC). (2 cr)

Principles/techniques to advise an FFA chapter. Historical/philosophical basis of FFA, organization/structure. Integration with classroom instruction, public relations, recruitment, and administration of FFA chapters.

AFEE 5697. Teaching Internship: School and Classroom Settings (UMTC). (2 cr; fall, every year)

Part-time supervised teaching experience in a school. Seminars on managing students' learning in work/community/family education programs in contemporary schools and on becoming a reflective educator.

AFEE 5698. Teaching Internship (UMTC). (6 cr; spring, every year)

Teaching experience in school system that provides programs for grades 5-12.

Agronomy (AGRO)

AGRO 1020. Special Topics. (1-3 cr [max 6 cr]; fall, spring, every year)

Identifying economically important crop/weed seeds throughout the United States.

AGRO 1030. Crop and Weed Identification. (3 cr; A-F or audit; fall, every year)

Morphological characteristics used in mature plant, seedling, and seed identification. Identifying economically important crops and weeds in all stages of growth throughout the United States.

AGRO 1183. Field Crops: Production Principles. (3 cr; fall, spring, every year)

Principles and cultural practices used in growing certain row crops, small grains, oil crops, and specialty crops.

AGRO 1540. Seed Conditioning and Technology. (4 cr; A-F or audit; prereq 1030; spring, even years)

Seed laws, certification standards, purity analysis, germination tests, vigor tests, principles of seed conditioning, handling equipment. Tours of facilities processing small grains, sunflowers, grasses, and legumes.

AGRO 1803. Directed Studies. (1-3 cr [max 6 cr]; prereq

Instructor consent; fall, spring, every year)

Current topics not covered in regularly offered courses.

AGRO 2573. Entomology. (3 cr; A-F or audit; =[NATR 2573]; prereq AGRO 1183 or HORT 1010; fall, every year)

Insect taxonomy, anatomy, and physiology. Emphasis on insects of economic importance, especially in the Upper Midwest. Control methods, including integrated pest management.

AGRO 2640. Applied Agriculture Chemicals. (3 cr; prereq 1030; fall, every year)

Applied use of agriculture chemicals. Safety, toxicity, efficacy, phytotoxicity, recommendations, environmental interactions.

AGRO 2840. Grain and Seed Evaluation. (4 cr; A-F or audit; prereq 1030; spring, every year)

Analytical techniques, procedures, and practices in interpreting U.S. grain standards. Identifying seeds of crops, weeds, and diseases. Lab practice in grading grain according to U.S. standards and determining grain quality.

AGRO 3023. Plant Breeding and Genetics. (4 cr; A-F or audit; prereq BIOL 1009; fall, even years)

Principles of plant breeding. Emphasizes application of genetic principles to plant breeding. Genetic variation, selection methods, cultivar development. Examples from common field/horticultural crops.

AGRO 3030. Research Techniques. (3 cr; A-F or audit; prereq Jr or sr; spring, every year)

Experimental design and methodology in plant science research. Basic philosophy, data interpretation and analysis, and application of research information to practical management situations.

AGRO 3130. Forages. (3 cr; A-F or audit; fall, even years)

Characteristics, distribution, preservation, and uses of forage crops for pasture, silage, hay, and soil improvement. Cultural practices, disease and insect control, seed production, forage storage. Interrelationships between animals and plants as they relate to selection, production, and utilization of forage crops.

AGRO 3230. Introduction to Plant Pathology. (3 cr; A-F or audit; prereq AGRO 1183 or HORT 1010, BIOL 1009; fall, every year)

Nature, diagnosis, and management of plant diseases. Identification, control, and life cycles of representative plant diseases significant in the Upper Midwest that illustrate plant pathology principles.

AGRO 3441. Topics in Specialty Crop Production. (1 cr [max 3 cr]; prereq 1030; spring, every year)

Lecture/discussion on one economically important or emerging specialty crop such as potato or sugar beet. Specific crop varies. Land selection, soil fertility, pest control, harvest, storage, quality, marketing.

AGRO 3444. Crop Production. (4 cr; A-F or audit; prereq 1183; fall, every year)

Principles, including best cultural practices for crops of particular economic importance to the region. Oilseed, small grain, and specialty crops.

AGRO 3620. Advanced Identification, Seed Analysis, and Grain Grading. (3 cr; prereq [1030, 2840] or instructor consent; fall, every year)

Advanced techniques in identification, seed analysis, and grain grading.

AGRO 3630. Integrated Crop Management (Capstone). (3 cr; A-F or audit; prereq 1030, 1540, 2640, 3030, 3230, SOIL 3414; spring, every year)

Capstone course. Students investigate, research, and study problems of agronomic crops and make recommendations. Students individually and in teams solve problems using scientific methods.

AGRO 3640. Weed Science. (3 cr; prereq [BIOL 1009, CHEM 1401, SOIL 1293] or instructor consent; spring, every year)

Mechanical, cultural, biological, and chemical weed control practices. Factors affecting control. Classification and modes of action of herbicides, insecticides, fungicides, and plant growth regulators.

AGRO 3804. Individual Studies. (1-3 cr [max 6 cr]; prereq Jr, instructor consent; fall, spring, every year)

Topic related to student's major not covered in regularly offered courses.

Animal Science (ANSC)

ANSC 1004. Introduction to Animal Science. (4 cr; A-F or audit; fall, spring, every year)

Survey of the meat animal, dairy, and equine industries. Emphasis on general management principles, health care, breeding, behavior, feeding, and care of dairy cattle, beef cattle, horses, sheep, and swine.

ANSC 1033. Introduction to Companion Animals. (3 cr; fall, every year)

Companion animal industry. Emphasizes identification, general management principles, health care, breeding, behavior, feeding, and humane care of companion animals.

ANSC 1101. Animal Evaluation. (1 cr [max 3 cr]; fall, every year)

Conformation, breed characteristics, type, and their importance in evaluation. Techniques of evaluation and interpretation of evaluation data.

ANSC 1201. Advanced Animal Evaluation. (1 cr [max 3 cr]; prereq 1101; spring, every year)

Advanced techniques in evaluating and selecting dairy or beef cattle, sheep, and swine. Preparing and delivering oral reasons.

ANSC 1205. Beef and Dairy Production Techniques. (2 cr; spring, every year)

Skills necessary for successful/economical beef and dairy production.

ANSC 1206. Sheep and Swine Production Techniques. (2 cr; spring, every year)

Skills necessary for successful/economical sheep/swine production.

ANSC 1803. Directed Studies. (1-3 cr [max 6 cr]; prereq Instructor consent; fall, spring, summer, every year)

Current topics not covered in regularly offered courses.

ANSC 2001. Artificial Insemination. (1 cr)

Anatomy/physiology, heat detection, hormone function/synchronization, semen storage/handling, AI technique, record keeping, sire selection. Practical technical skills to run AI programs.

ANSC 2104. Feeds and Feeding. (4 cr; prereq 1004, high school chem or CHEM 1001; fall, every year)

Identification and use of feed grains, forages, supplemental feeds, and additives. Bushel weights, price, and cost per unit calculations. Moisture content calculations. Factors influencing feed quality, feed value, price, and storage. Digestion, ration formulation, and feed processing methods.

ANSC 3004. Livestock Facilities and Environmental Systems. (3 cr; prereq 1205 or 1206, MATH 1031, or instructor consent; fall, even years)

Effects of environment on animal production. Principles of environmental control. Planning open, partial, and total environmentally controlled systems for livestock. Functional, economic, and environmental considerations. Feed handling systems, waste management alternatives.

ANSC 3023. Animal Breeding. (3 cr; prereq 1004; fall, every year)

Application of qualitative genetic principles to animal breeding. Quantitative genetics. Livestock improvements through breeding/selection systems.

ANSC 3052. Meat and Dairy Processing. (3 cr; fall, every year)

Packaging/processing dairy/meat. Effects of hygiene/sanitation on product quality. Types of spoilage. Microbial ecology within the industry.

Course Abbreviations

Prereq	course prerequisites
cr	credit
equiv	equivalent
fr, soph, jr, sr	freshman, sophomore, junior, senior
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Course Numbers

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Term Offered

A notation following course prerequisites indicates what term the course is offered (fall, spring, May session, or summer), and whether the course is offered every year, or in even or odd years.

Abbreviations in parentheses following a course name indicate the university that offers the course:

- UMTC**University of Minnesota, Twin Cities
- NDSU**.....North Dakota State University

ANSC 3104. Applied Animal Nutrition. (4 cr; prereq 2104, [CHEM 1401 or [CHEM 3021 or concurrent enrollment in CHEM 3021]]; spring, every year)
Continuation of digestion/metabolism to include modifications/control. Application of nutritional principles to economical feeding of different farm animal species. Nutrient requirements/modifications due to weather, stress, feeding objectives, environment, and metabolic limitations. Computer formulation of rations.

ANSC 3203. Animal Anatomy and Physiology. (4 cr; prereq 1004, BIOL 1009; fall, every year)
Anatomy/physiology of several species. Organization of body from cells into tissues/organs. Identification, comparison, and contrast of different species. Growth development/function of selected bodily systems.

ANSC 3204. Dairy Production. (4 cr; A-F or audit; prereq 1205 or 1206, 2104; fall, every year)
Growth/development of dairy cattle. Genetics/breeding, dairy nutrition, growth/development of heifer to first calving. Getting cows into production and their subsequent management, including milking management skills.

ANSC 3205. Dairy Management Practicum. (3 cr; prereq Sr or instructor consent; fall, offered when feasible)
Management and clinical skills, including those unique to large dairy herds.

ANSC 3303. Beef Production. (3 cr; prereq ANSC 1205 or 1206, 2104; fall, every year)
Application of technology and information to systems of managing beef operations. Incorporation of economics, farm management, records, and production science in management plans. Computer applications in management.

ANSC 3304. Reproduction, AI, and Lactation. (4 cr; prereq 3203; spring, every year)
Functions of reproductive organs, fertilization, the estrous cycle and its endocrine control, reproductive efficiency and problems, principles of artificial insemination. Anatomy, physiology, and biochemistry of the mammary gland; mammary growth; initiation of and maintenance of lactation. Milk synthesis and factors influencing the lactation curve.

ANSC 3441. Current Topics in Animal Science. (1 cr; prereq ANSC 1203, 2104, 3304 or concurrent enrollment in 3304; fall, every year)
Focus on one economically important or emerging topic in animal science (e.g., swine, sheep, companion animal). Lecture/discussion.

ANSC 3503. Animal Health and Disease. (3 cr; prereq 3203; spring, every year)
Concepts of health and disease with emphasis on prevention through health plans and enhancing immunity. Influence of environment and other stressors on health and disease.

ANSC 3804. Individual Studies. (1-3 cr [max 6 cr]; prereq Jr, instructor consent; fall, spring, summer, every year)
Topic related to student's major not covered in regularly offered courses.

ANSC 4204. Animal Systems Management. (4 cr; A-F or audit; prereq 1205 or 1206, 3004, 3204 or 3303 or instructor consent; spring, every year)
Planning, budgeting (cash, feed, machinery, etc.), and implementing programs; facilities; labor force; and other factors required for operation of modern animal operations. Field trips, planning for existing operations.

Applied Business (ABUS)

ABUS 4012. Problem Solving in Complex Organizations (UMTC). (3 cr; fall, spring, summer, every year)
Develops open systems perspective. Emphasizes importance of analyzing root causes, effects of problems, solutions across boundaries in the organization. Process analysis introduced as tool for problem solving.

ABUS 4022. Management in Organizations (UMTC). (3 cr; fall, spring, summer, offered when feasible)
Demands on today's managers. Techniques/ideas beyond traditional studies. Focuses on small- to medium-sized organizations. Applying management theory to all levels. Managing in global workplace. Organizational planning, decision making. Organizing resources. Leading/motivating people. Controlling/evaluating organizational activities.

ABUS 4023. Communicating for Results (UMTC). (3 cr; fall, spring, summer, offered when feasible)
Aspects of communication that are essential to being persuasive/influential. Organizing/presenting ideas effectively, strategies for audience analysis, choosing communication methods, appropriately using informal influence, handling dissent.

ABUS 4104. Management and Human Resource Practices (UMTC). (3 cr; fall, spring, summer, every year)
Overview of human resource practices in organizations, responsibilities of front-line managers. Emphasizes providing day-to-day leadership: organizing work, motivating employees, delegating, coordinating, achieving results.

Applied Studies (APLS)

APLS 3001. Individual Program Development. (.5 cr; prereq Acceptance into Applied Studies degree program; fall, spring, every year)
Developing degree outcomes relevant to career objectives. Designing individual program of study for Applied Studies baccalaureate degree.

APLS 3900. Internship/Field Experience. (1-3 cr [max 3 cr]; prereq 3001, adviser consent; fall, spring, summer, every year)
Supervised professional work experience in selected sites. Reports and consultation with faculty adviser and employer.

APLS 4652. Applied Studies Seminar. (2.5 cr; prereq 3001, within 1 semester of graduation, adviser consent; fall, every year)
Capstone course. Students present projects demonstrating integration of fields of study, general education, work experience, and computer applications.

Art (ART)

ART 1152. Drawing and Design. (1-3 cr [max 3 cr]; fall, spring, every year)
Introduces foundations of drawing/design. Offered as 1-credit art appreciation lecture or as 3-credit studio lab/lecture. Lecture studies concepts/history of drawing/design. Studio work is practical application.

ART 1252. Color and Design. (1-3 cr [max 3 cr]; spring, every year)
Introduces foundations of color (painting) and design. Offered as 1-credit art appreciation lecture or as 3-credit studio lab/lecture. Lecture studies concepts/history of drawing/design. Studio work is practical application.

ART 1352. Art Design and Techniques. (1-3 cr [max 3 cr]; fall, spring, offered when feasible)
Introduces foundations of art techniques (3-dimensional) and design. Offered as 1-credit art appreciation lecture or as 3-credit studio lab/lecture. Lecture studies concepts/history of drawing/design. Studio work is practical application.

ART 2000. Elementary Art. (3 cr; fall, every year)
How art can provide a means for children to develop their inherent creative abilities. Studio experience for putting methods into practice.

Aviation (AVIA)

AVIA 1103. Introduction to Aviation. (4 cr; fall, every year)
Preparation for FAA private pilot written exam. FAA regulations, weather, radio navigation, flight safety, emergency procedures.

AVIA 1104. Introduction to Aviation Flight Lab. (1 cr; prereq 1103 or concurrent enrollment in 1103; fall, spring, every year)
Flight lab lessons leading to private pilot certificate. Flight lessons must be completed or private pilot certificate received before course credit is issued.

AVIA 1396. Conventional Aircraft Operations. (1 cr; A-F or audit; prereq 1103, 1104 or instructor consent; fall, spring, every year)
Ground school, dual flight instruction for endorsement for operation of tail wheel airplanes on ground, in flight.

AVIA 1803. Directed Studies. (1-3 cr [max 6 cr]; prereq Instructor consent; fall, spring, summer, every year)
Current topics not covered in regularly offered courses.

AVIA 2220. Basic Attitude Instrument Flying. (2 cr; prereq 1103, 1104; fall, every year)
Operation, interpretation, and practical use of VOR, ADF, DME, RNAV, RMI, HIS, AND GPS systems. Instrument charts required for IFR flight.

AVIA 2221. Basic Attitude Instrument Flying Lab. (1 cr; prereq 1103, 1104; fall, every year)
Flight Lab associated with AVIA 2220. Flight by reference to instruments, including electronic navigation and instrument charts.

AVIA 2222. IFR Regulations and Procedures. (2 cr; prereq 2220, 2221; spring, every year)
Regulations, procedures, publications for operating IFR in national airspace system. Terminal/en route procedures.

AVIA 2223. IFR Regulations and Procedures Flight Lab. (1 cr; prereq 2220, 2221; spring, every year)
Flight lab associated with 2222. Instrument approach/departure procedures. Regulations/procedures associated with instrument flight operations. Upon completion of this course and 2221, the student is recommended to take FAA Instrument rating practical test.

AVIA 3320. Airplane Aerodynamics. (2 cr; prereq 2222, 2223; fall, every year)
Aerodynamics, performance, stability, control, weight/balance, special flight conditions as appropriate for commercial pilots. Commercial maneuvers, flight computers, commercial regulations.

AVIA 3321. Airplane Aerodynamics Flight lab. (1 cr; prereq 2222, 2223; fall, every year)
Flight lab associated with 3320. Students train in a complex aircraft. Maneuvers/procedures required to complete FAA Commercial Pilot certificate. At completion of course, the student is endorsed for operation of a complex aircraft and recommended to take FAA Commercial practical test.

AVIA 3324. Aircraft Systems and Instruments. (3 cr; A-F or audit; prereq 1103, 1104 or instructor consent; spring, every year)
Flight instruments, reciprocating engines. Propeller, electrical, environmental, hydraulic, pneumatic, fuel, ignition, lubrication, and pressurization systems. Commercial regulations, including FARs part 61, 91, 121, and 135.

AVIA 3355. Multi-engine Systems and Procedures. (2 cr; A-F or audit; prereq Instructor consent; offered on-demand; fall, spring, offered when feasible)
Operating light twin-engine airplanes. Pilot actions for managing normal/abnormal aircraft situations. Multi-engine aircraft systems. Students must complete flight lessons.

AVIA 3396. Advanced Conventional Aircraft Operations (UND). (1 cr; A-F or audit; prereq 1396; fall, spring, every year)
Ground school, dual flight instruction for advanced pilot maneuvering, flight applications of tail wheel airplanes. Students must complete flight lessons.

AVIA 3400. Emergency Maneuver Training. (1 cr; prereq 1103, 1104, 1396; fall, spring, every year)
Introduction/exploration of high-angle of attack flight. Emphasizes recognition/recovery from unusual attitudes, control failures, and in-flight emergencies.

AVIA 3412. CFI Certification. (4 cr; prereq [3320, 3321, 3324] or instructor consent; fall, spring, offered when feasible)
Preparation for FAA Certified Flight Instructor written tests. Flight instructor responsibilities, teaching concerns, effective teaching methods, learning process, flight training syllabi, effective evaluations. Offered on demand.

AVIA 3413. CFI Certification Flight Lab. (1 cr; prereq 3412; fall, spring, offered when feasible)
Flight lab lessons leading to Certified Flight Instructor Certificate. Flight lessons must be completed or certificate received before course credit is issued.

AVIA 3415. Instrument CFI Certification. (4 cr; A-F or audit; prereq 3412, 3413; offered on demand; fall, spring, offered when feasible)

Instrument flight instructor responsibilities and techniques. Additional study of instrument flight, ATC system, charts, publications, and rules of IFR environment as they pertain to teaching. Practical teaching experience. Students must complete the instrument rating for a flight instructor certificate.

AVIA 3602. Natural Resources and Enforcement Applications. (2 cr; A-F or audit; spring, odd years)
Mission specific knowledge/skills in natural resources and law enforcement aviation. History/purposes, authority, operations, safety, records. Equipment and best practices for natural resources and law enforcement aviators.

AVIA 3804. Individual Studies. (1-3 cr [max 6 cr]; prereq Jr, instructor consent; fall, summer, every year)
Topic related to student's major not covered in regularly offered courses.

Bachelor of Manufacturing (BM)

BM 3005. Facilities Planning and Selection. (3 cr; =[ASM 3005]; fall, odd years)
Planning facility design. Selecting materials/equipment used in manufacturing and production operations.

BM 3006. Maintenance and Safety Management. (3 cr; prereq MATH 1150; fall, even years)
Reliability, predictive techniques, non-destructive testing, equipment effectiveness, operator/employee education, maintenance project management, failure analysis, troubleshooting methods, workplace safety.

BM 3007. Metrology. (3 cr; summer, every year)
Instrument calibration, reading engineering standards, precision measurement, geometric dimensioning/tolerancing, graphical inspection analysis, measuring tools, surface plate inspection methods.

BM 3008. Regulations and Compliance. (3 cr; fall, every year)
Contributions by Demming, Juran, Ishikawa, Feigenbaum, Crosby, and Taguchi. Global quality. International standards, including ANSI and ISO. Strategic quality planning, six-sigma management tools.

BM 3012. Applied Engineering Principles. (3 cr; spring, every year)
Overview of electrical systems, motors, lighting, floors, walls, drains, boilers, heat transfer systems, and hydraulic systems in manufacturing/food industry facilities.

BM 3020. Industrial Safety. (3 cr; A-F or audit; prereq PMTC 2800 [Northwest Technical College]; fall, spring, offered when feasible)
Comprehensive approach to safety problems in the workplace, including OSHA standards, attitude development, safety auditing, and hazard analysis.

BM 3034. Quality Management Systems. (3 cr; fall, every year)
Managing responsibilities of a quality standards department. Development of grades/standards of quality, acceptance sampling/inspection, recording, reporting/use of control charts.

BM 3053. Product Development Management. (3 cr; =[AGBU 3053]; spring, every year)
Quality assurance aspects of development process. Methods to identify opportunities for improvement. Dynamic input from consumers via sales/marketing. Designing/manufacturing a product/service with quality parameters that consumers would purchase.

BM 3804. Individual Studies. (1-3 cr [max 6 cr]; A-F or audit; prereq Jr, instructor consent; fall, spring, summer, every year)
Topic related to student's major not covered in regularly offered courses.

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BM 3900. Internship. (1-3 cr [max 3 cr]; A-F or audit; prereq Jr; fall, spring, summer, every year)
Supervised professional work experience in manufacturing plant situations to help students gain an in-depth understanding of their field of study. Reports and consultations with faculty advisers and employers.

Biology (BIOL)

BIOL 1001. Nature of Life. (2 cr; prereq Biology major; fall, every year)

Introduction to biology program, faculty, coursework, and expectations. Mandatory camping trip to Itasca State Park.

BIOL 1009. General Biology. (4 cr; prereq High school science courses; fall, spring, summer, every year)

Major concepts of modern biology. Molecular structure of living things. Energy recruitment/utilization. Flow of genetic information through organisms/populations. Principles of inheritance, ecology, and evolution. Lab.

BIOL 1009H. Honors: General Biology. (4 cr; prereq High school chemistry or consent of instructor; fall, spring, every year)

Quantitative methods used to emphasize the dynamic nature of biology. Modern biology. Molecular structure of living things, energy recruitment/utilization, flow of genetic information through organisms/populations. Principles of inheritance, ecology, and evolution. Includes lab.

BIOL 1803. Directed Studies for the Biological Sciences. (1-3 cr [max 12 cr]; prereq Instructor permission; fall, spring, summer, every year)

Participation in research for talented undergraduates with fewer than 30 credits.

BIOL 2012. General Zoology. (4 cr; prereq 1009; spring, every year)

Major animal groups (phyla). Applications of morphological, physiological, and developmental characteristics to define evolutionary relationships. Parasitic forms affecting human welfare. Lab requires dissection, including mammals.

BIOL 2022. General Botany. (3 cr; prereq 1009 or 1009H; fall, spring, every year)

Principles of plant biology. Organization, function, growth/development, and reproductive biology of plants and plant-like organisms. Lab included.

BIOL 2032. General Microbiology. (4 cr; prereq BIOL 1009 or 1009H or 1464, CHEM 1001 or 1021; fall, every year)

Fundamental principles of microbiology. Bacterial metabolism, growth, and genetics. Biology of viruses/fungi. Microorganisms and disease. Applied microbiology.

BIOL 2103. Human Anatomy and Physiology I. (4 cr; prereq 1009; fall, every year)

Systems approach to anatomical structures and physiological functions of human body. Key concepts at chemical, cellular, tissue, and organ levels. Emphasizes spatial relationships of structures and their related functions within integumentary, skeletal, muscular, nervous and endocrine systems. Lab.

BIOL 2104. Human Anatomy and Physiology II. (4 cr; prereq 1009; spring, every year)

Systems approach to anatomical structures and physiological functions of human body. Emphasizes spatial relationships of structures and their related functions within circulatory, lymphatic, respiratory, and digestive systems. Metabolism, nutrition, urinary/reproductive systems, human development. Genetics concepts. Lab.

BIOL 3022. Principles of Genetics. (3 cr; prereq BIOL 1009, CHEM 1021 or 1401, MATH 1031 or 1131 or 1150; spring, every year)

Basic principles of Mendelian, molecular, and population genetics. Computer simulations/models used to study aberrations and their implications.

BIOL 3027. Cell Biology. (3 cr; prereq 1009, [1401 or CHEM 1021]; fall, every year)

Structure/function of prokaryotic/eukaryotic cells, including cell surface, membranes, organelles, cytoskeleton, cell growth, cell physiology, experimental methods used in cell studies. Lab includes contemporary cell biology research techniques, hypothesis testing, and communication of results.

BIOL 3122. Evolution. (3 cr; prereq 1009; spring, every year)
Origin, history, opposition, and evidence supporting evolutionary ideas. Origin of life, phylogeny, biological history, mechanisms of evolutionary change, population genetics, speciation, tempo of evolution, macroevolution, extinction, biogeography.

BIOL 3131. Plant Physiology. (3 cr; prereq 2022, CHEM 1401; spring, every year)

Plant functions with emphasis on higher plants. Growth and development, mineral nutrition, translocation, water relations, photosynthesis, and nitrogen metabolism.

BIOL 3140. Histology. (4 cr; prereq 1474 or 3027 or consent of instructor; fall, odd years)

Microscopic examination of morphological characteristics of human tissues, organs, and blood cells. Lab.

BIOL 3420. Ecotoxicology. (3 cr; prereq CHEM 1001; summer, odd years)

Overview of ecotoxicology ranging from molecular to global issues. Major classes of contaminants, bioaccumulation, toxic effects, and risks.

BIOL 3464. Mammalogy. (3 cr; =[NATR 3464]; prereq 2012; fall, every year)

Classification, reproduction, physiology, behavior, ecological adaptations, zoogeography of mammals. Emphasizes techniques used in field/laboratory studies.

BIOL 3466. Ornithology. (3 cr; =[NATR 3466]; prereq 2012; spring, every year)

Classification, reproduction, physiology, behavior, ecological adaptations, zoogeography of birds. Emphasizes techniques used in field/laboratory studies.

BIOL 3722. Limnology. (3 cr; prereq BIOL 2022, CHEM 1001, PHYS 1012, MATH 1031 or 1131 or 1150; fall, even years)

Description/analysis of events in lakes, streams, and ponds, beginning with their origins and progressing through their physics, chemistry, and biology. These parameters interrelated with population of aquatic environment.

BIOL 3822. Techniques in Molecular Biology. (4 cr; prereq 2032, 3022, [CHEM 3021 or concurrent registration in CHEM 3021]; spring, odd years)

Basic recombinant DNA techniques. Methods for growing, isolating, and purifying recombinant DNA and cloning vectors. DNA sequencing, sequence analysis. Gene expression. Polymerase chain reaction (PCR). Other current techniques. Lab.

BIOL 3899. Pre-Internship Seminar. (.5 cr; spring, every year)

Expectations/responsibilities of internship. Preparing for graduate school application/job search. Presentations about internship experiences by those who have recently completed 3900 (internship). Discussions between students, staff, and invited guests.

BIOL 3900. Internship. (1-2 cr [max 2 cr]; prereq 3899, department approval, consent of instructor; fall, spring, summer, every year)

Credit given for professional work experience outside an academic department.

BIOL 3901. Post-Internship Seminar. (.5 cr; prereq 3900; spring, every year)

Students who have recently completed internships prepare/deliver PowerPoint presentation on experience. Discussions between post-/pre-internship students, staff, and invited guests.

BIOL 3994. Undergraduate Research. (1-3 cr [max 3 cr]; prereq Instructor's consent; fall, spring, summer, every year)
Advanced independent work in special fields.

BIOL 4101. Biology Seminar. (1 cr; prereq Sr; fall, spring, every year)

Survey of current literature. Preparation/presentation of selected topics. Evaluation of seminars. Utilizing contemporary research/presentation technologies.

BIOL 4361. Developmental Biology. (4 cr; prereq 3022, 3027; fall, even years)

Molecular/cellular mechanisms of development. Emphasizes animal systems. Cell cycle, gametogenesis, fertilization, morphogenetic movements, cytodifferentiation, cell interactions, pattern formation, gene expression, organogenesis, metamorphosis, regeneration and aging. Lab.

Chemistry (CHEM)**CHEM 992. Basic Chemistry.** (0 cr; A-F or audit; prereq [3 cr equiv]; High school algebra; fall, every year)

Measurements, metric system. Atomic/molecular structure, nomenclature, balancing chemical equations.

CHEM 1001. Introductory Chemistry. (4 cr; prereq High school algebra, high school chem; fall, spring, every year)

For students who do not need professional-level general chemistry. Atomic and molecular structure, inorganic nomenclature, chemical equations, quantitative relationships, behavior of gases, phases of matter, solution chemistry, chemical dynamics, acid/base chemistry, oxidation-reduction process, nuclear processes, introduction to organic and biochemistry.

CHEM 1021. Chemical Principles I. (4 cr; prereq CHEM 1001; fall, spring, every year)

Concepts of inorganic chemistry, atomic theory/structure, periodicity of elements. Basic rules of oxidation and chemical combination. Molecular structure (hybridization, molecular orbitals). Thermochemistry, gases, solution process, colligative properties.

CHEM 1022. Chemical Principles II. (4 cr; prereq CHEM 1021 minimum C grade; spring, every year)

Behavior of gases, thermodynamics, properties of solutions, solution equilibria, and oxidation/reduction reactions. Rigorous course: develops chemical foundations required in some agriculture, environmental, and preprofessional programs.

CHEM 1401. Elementary Bioorganic Chemistry. (4 cr; prereq 1001 or 1022; fall, every year)

Organic chemistry as applied to important biochemical molecules.

CHEM 2301. Organic Chemistry I. (3 cr; prereq 1022, concurrent enrollment in 2310; fall, every year)

Important classes of organic compounds, their structures/reactions. Relation between structure, reactivity, and properties. Spectroscopic characterization of organic molecules.

CHEM 2302. Organic Chemistry II. (3 cr; prereq [Grade of at least C- in 2301 or consent of instructor], concurrent enrollment in 2311; spring, every year)

Reactions, synthesis, and characterization of organic compounds and biologically significant classes of organic compounds (lipids, carbohydrates, amino acids, proteins, nucleic acids).

CHEM 2310. Organic Chemistry Laboratory I. (2 cr; prereq Concurrent enrollment in 2301; fall, every year)

Laboratory techniques in synthesis, purification, and characterization of organic compounds.

CHEM 2311. Organic Chemistry Laboratory II. (2 cr; prereq 2310, concurrent enrollment in 2302; spring, every year)

Lab techniques in synthesis, purification, and characterization of organic compounds.

CHEM 3021. Biochemistry. (3 cr; prereq Grade of at least C- in [2301 or consent of instructor], BIOL 1009; spring, every year)

Fundamentals of biochemistry. Structure/function of proteins, nucleic acids, lipids, and carbohydrates. Metabolism, regulation of metabolism. Quantitative treatments of chemistry equilibria, enzyme catalysis, and bioenergetics. Chemistry basis of genetic information.

CHEM 3022. Analytical Chemistry and Spectroscopy. (4 cr; prereq 2301, 2310; fall, every year)

How to conduct research and analyze organic/inorganic chemicals for quality control or product/process development using techniques such as chromatography, spectroscopy, and spectrophotometry.

CHEM 3994. Undergraduate Research in Chemistry. (1-3 cr [max 6 cr]; prereq 2301, 2310; fall, spring, every year)

Laboratory techniques used in chemistry. Literature pertaining to field. Students write proposals for UROP/UROC grants.

Communication (COMM)**COMM 2002. Interpersonal and Group Processes.** (3 cr; fall, every year)

Interpersonal/group dynamics/relationships.

COMM 2223. English Grammar and Usage. (3 cr; prereq Comp 1013; fall, spring, summer, every year)

Grammar, grammatical concepts. Analysis of processes and structural rules that describe how words combine with each other to form sentences. Practice in sentence diagraming.

COMM 2334. Communication Topics. (3 cr; A-F or audit; prereq COMP 1013; fall, every year)

Applying writing process to professional communication situations. Dissemination products containing text/visuals meeting professional community standards.

COMM 2434. Oral Interpretation and Performance Techniques. (3 cr; fall, odd years)

Analyzing prose, poetry, and drama. Preparing material for presentation. Giving stimulating oral readings to an audience. Critical appreciation of literature, use of voice/gesture. Critiquing performances.

COMM 3000. Communication Theory. (3 cr; prereq Comp 1013, Spch 1101; spring, every year)

Identifying, defining, synthesizing, applying, and critiquing communication theories. Focuses on relationship between theory/practice within interpersonal, group, organizational, and societal settings.

COMM 3001. Communication in Human Relationships. (3 cr; fall, every year)

Anti-relational/relational communication, interpersonal/group processes, conflict management, collaboration, team building, and leadership.

COMM 3008. Business Writing. (3 cr; prereq Comp 1013, Spch 1101; fall, spring, every year)

Practical application of writing effective business letters, memos, emails, faxes. Tables, other graphics. Informal/formal informational/analytical reports. Professional oral/Web presentations. Development of personal writing style. Practice of appropriate business tone, etiquette.

COMM 3303. Writing in Your Profession. (3 cr; A-F or audit; prereq Comp 1011, 1013; fall, spring, every year)

Writing about subjects related to students' academic disciplines and future professions. Developing persuasive writing skills for academic, personal, and professional purposes. Effective communication principles, audiences, formats, and technologies.

COMM 3431. Persuasion. (3 cr; prereq SPCH 1101; fall, spring, summer, every year)

Persuasion in interpersonal, organizational, intra-/inter-cultural relationships. Contemporary persuasion with historical segments. Argumentative claims and how to analyze/respond coherently to them.

COMM 3537. Visual Communication. (3 cr; prereq CA 1030, 1040, Comp 1013, Spch 1101; spring, even years)

Visual delivery of end-products in professional communication. Classical/contemporary theories of visual delivery. Designing visual delivery to reflect personal philosophy of communication. Integrating visual delivery system with text to meet professional/client standards.

COMM 3704. Business and Professional Speaking. (3 cr; prereq COMP 1013, SPCH 1101; fall, every year)

Developing proficiency in communication/presentation skills in business contexts. Preparing, selecting, organizing, designing, and delivering oral messages in business situations. Meeting/group facilitation, interviewing, and professional presentations.

COMM 3804. Individual Studies. (1-3 cr [max 6 cr]; prereq Jr or instructor consent; fall, spring, summer, every year)

Topic related to student's major, not covered in regularly offered courses.

COMM 3855. Topics in Communication. (3 cr [max 9 cr]; prereq Jr; fall, spring, every year)

Current trends/practices in communication. Editing, training, event planning, political communication.

Course Abbreviations

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COMM 3900. Internship. (3 cr [max 6 cr]; A-F only; prereq 12 cr of COMM courses; fall, spring, summer, every year)
Supervised professional work experience at selected sites. Reports/consultation with faculty adviser/employer.

COMM 4703. Communication Ethics. (3 cr; prereq Comp 1013, Spch 1101; fall, every year)
Literature pertaining to ethics in organizations. Relativism, subjectivism, objectivism, utilitarianism, Kantianism, virtue ethics, existentialism.

COMM 4704. Organizational Communication. (3 cr; prereq 3000, COMP 1013, SPCH 1101; spring, every year)
Using communication processes to create/maintain organizations (e.g., meetings, employee assimilation, interpersonal relationships, decision making, leadership). Recognizing/identifying communication issues in organizations and applying organizational communication concepts, models, tools, and theories to resolve them.

COMM 4800. Crisis Communication. (3 cr; prereq COMP 1013, SPCH 1101; fall, even years)
Organizational crises, disasters, and emergency situations. Existing academic literature, everyday media literature. Focuses on appropriate communication strategies, written composition, and delivery of speeches.

COMM 4802. Publication Design and Management. (3 cr; prereq CA 1030, CA 1040, COMP 1013, SPCH 1101; spring, even years)
Applying project management principles to manage a publication from concept to final product. Design principles, desktop publishing software, audience analysis, usability testing, production. Using table presentations to communicate process and final product to clients/guests.

COMM 4900. Public Relations. (3 cr; prereq COMP 1013, SPCH 1101; spring, even years)
Overview of theory, practice, roles, and techniques used in public relations within organizations. Writing news releases, conducting news conferences, planning/implementing events, responding to challenging questions from audience members, and conducting public relations audit of an organization.

Composition (COMP)

COMP 1000. College Writing Laboratory. (1 cr; prereq concurrent enrollment in 1011; fall, spring, every year)
Supplemental instruction in writing. Small group activities, individual conferencing.

COMP 1011. Composition I. (3 cr; A-F or audit; fall, spring, every year)
Process of clear, concrete, and convincing writing. Generation and discovery of subjects, revisions, editing.

COMP 1011H. Honors: Composition I. (3 cr; prereq Admittance in the Honors Program; fall, every year)
Process of clear, concrete and convincing writing. Generation and discovery of subjects, revisions, editing.

COMP 1013. Composition II. (3 cr; prereq 1011; fall, spring, every year)
Writing a research paper/s. Formulating/answering a research question. Developing an organizational/argument strategy for topic/audience. Supporting research question/argument with scholarly sources.

COMP 1013H. Honors: Composition II. (3 cr; prereq [1011 or 1011H], admittance to Honors Program; spring, every year)
Writing summaries, writing to synthesize material from several sources, evaluating readings and other materials, research writing.

Computer Applications (CA)

CA 1010. Introduction to Computer Technology. (1 cr; fall, spring, every year)
Introduction to computer literacy, care of laptop, policies, email and word processing essentials, PALS and portfolio development.

CA 1012. Application Suite Software. (2 cr; fall, every year)
Introduction to word processing, spreadsheet, and presentation graphics.

CA 1015. Word Processing and Publishing Applications. (3 cr; fall, spring, summer, every year)
Desktop publishing techniques using Microsoft Word in the generation and development of advanced word processing documents; using Microsoft Publisher for the creation, design, and production of professional quality documents that combine, text, graphics, illustrations, and photographs for camera ready publications.

CA 1020. Spreadsheet Applications. (3 cr; fall, spring, summer, every year)
Personal/presentation use of spreadsheets that include formulas, functions, what-if analysis, and charts. Focuses on applying spreadsheet applications to individual academic disciplines.

CA 1030. Multimedia Applications. (3 cr; fall, spring, summer, every year)
Developing advanced graphics, animation, and audio/video materials for personal/professional presentations.

CA 1040. Web Site Development. (3 cr; fall, spring, summer, every year)
Web site design. HTML/XML, scripting, graphics, Web services, user interface design.

CA 1055. Animation Software Applications. (3 cr; fall, spring, summer, every year)
Fundamentals of animation applications. Students create animated page for Web sites and interactive learning components for gaming and E-learning.

CA 1060. Database Applications. (3 cr; fall, spring, summer, every year)
Techniques for designing, developing, prototyping, creating, querying, reporting, and maintaining databases with MS Access.

CA 2190. Topics in Computer Applications. (1-3 cr [max 3 cr]; fall, spring, summer, every year)
Topics related to advanced computer application certification, such as MOS, IC3, CComp TIA, Linux, and Oracle.

Criminal Justice (CRJS)

CRJS 1500. Introduction to Criminal Justice. (4 cr; fall, every year)
Analysis of criminal justice system. Focuses on police, courts, corrections, and notion of justice in American society.

CRJS 1803. Directed Studies. (1-3 cr [max 6 cr]; prereq Instructor consent; fall, spring, summer, every year)
Current topics not covered in regularly offered courses.

CRJS 2100. Crime and Criminology. (3 cr; fall, every year)
Legal definitions of criminal/delinquent behavior. Typologies of crime/criminals. Trends in reported distribution of crime/delinquency within population. Theoretical explanations.

CRJS 2400. Introduction to Corrections. (3 cr; prereq 1500; spring, every year)
Penology. History, philosophy, programs, policies, and problems associated with correctional practice. Topics include probation, prisons, jails, parole, community corrections, and alternative sanctions.

CRJS 2500. Introduction to Policing. (3 cr; prereq 1500; spring, every year)
Development of police in America, past, present, and future. Institutional context of police activity. Bureaucratization of police. Professionalization, role of police. Police/community change.

CRJS 2550. Traffic Law. (2 cr; spring, every year)
Motor vehicle and traffic code. Private/commercial vehicle regulations. Licensing regulations.

CRJS 2560. First Responder. (3 cr; spring, every year)
Care for traumatic accidents, injuries, and medical emergencies. Successful completion of course results in certification as first responder with Minnesota Emergency Medical Services Regulatory Board (EMSRB).

CRJS 3350. Criminal Justice Administration. (3 cr; spring, every year)
Application of leading administrative theories to problems of criminal justice system. Bureaucratic nature of American criminal justice system as complex organization.

CRJS 3455. Institutional Corrections. (3 cr; fall, every year)
Function, structure, and operation of American adult/juvenile correctional institutions.

CRJS 3465. Strategies in Correctional Rehabilitation. (3 cr; prereq 2400; fall, every year)
Treatment philosophies/strategies for supervision, parole, and probation. Community-based correctional alternatives. Offender classification. Special offender groups. Treatment, custody, recidivism. Strategies to change offender conduct.

CRJS 3475. Community Corrections. (3 cr; spring, every year)
Intervention strategies as alternatives to institutional corrections in sentencing adjudicated persons. Community corrections, parole, house arrest, restitution, community service. Development of intervention services in support of dispositions.

CRJS 3505. Judicial Process. (3 cr; prereq 1500; fall, every year)
Criminal justice judicial process. Judicial involvement from pre-arrest warrant issuance to appellate court review. Role/behavior of prosecutors, defense attorneys, judges.

CRJS 3515. Criminal Justice Ethics. (3 cr; spring, every year)
Ethical issues/dilemmas facing practitioners in criminal justice. Students' own ethical questions pertaining to their area of interest. Development of solutions to dilemmas they may encounter.

CRJS 3520. Natural Resource Law Enforcement Techniques. (3 cr; [NATR 3520]; prereq 1120, NATR 1233; spring, even years)

Survey of methods, procedures, and techniques in natural resource field law enforcement work. Natural resource case law. Applicable statutes pertaining to tenets of search/seizure, arrest, surveillance, and court system.

CRJS 3525. Juvenile Justice and Delinquency. (3 cr; fall, every year)
Processing/treatment of juvenile offenders. Organization, operations, and goals of individuals, agencies, and institutions that work with offenders.

CRJS 3530. Criminal Justice Diversity. (3 cr; fall, every year)
Dynamics of class, race, and gender as they intersect with crime/justice in the United States. How class, race, and gender separately/together influence criminal justice system. Reforms to reduce bias in crime control.

CRJS 3550. Criminal Investigation. (3 cr; prereq 2500; spring, every year)
Rules of evidence as applied in criminal investigation/court. Relevant issues, legal standards. Principles/techniques in criminal investigation procedures and surveillance.

CRJS 3575. Critical Issues in Policing. (3 cr; prereq 2500; fall, every year)
Function of law enforcement, roles of police in modern society. Police organizations/officers/work. Critical problems, policing strategies. Dealing with mentally disturbed. Police-minority/-community relations.

CRJS 3804. Individual Studies. (1-3 cr [max 6 cr]; prereq Instructor's consent; fall, spring, summer, every year)
Topic related to student's major not covered in regularly offered courses.

CRJS 3900. Criminal Justice Field Placement (Internship). (3 cr; prereq Instructor consent; fall, spring, summer, every year)
Observation, participation, and study in selected criminal justice agencies.

CRJS 4315. Women and Crime. (3 cr; fall, every year)
Historical/theoretical perspectives and contemporary trends concerning women and crime. Processing of women by criminal justice system. Women as criminal justice professionals.

CRJS 4390. Special Topics in Criminal Justice. (1-3 cr [max 6 cr]; spring, every year)
Independent investigation of topics of special interest related to criminal justice. Topics vary to reflect contemporary criminal justice issues.

CRJS 4435. Theories of Punishment. (3 cr; spring, every year)
Philosophical issues associated with criminal punishment.

CRJS 4510. Victimology. (3 cr; fall, every year)
Criminological examination of victims. Victims' reactions. Responses by criminal justice system and other societal agencies.

CRJS 4540. Criminal Law. (4 cr; fall, every year)
Elements of criminal offenses in the United States and Minnesota. Crimes against persons/property. Administration of justice. Cases outline judicial interpretation of criminal law.

CRJS 4550. Criminal Procedure. (4 cr; spring, every year)
Rights of criminally accused, primarily in pretrial stages. Bill of Rights. Constitutional law. Police procedures permissible within confines of federal/state constitutions.

Curriculum and Instruction (CI)

CI 5452. Reading in the Content Areas for Initial Licensure Candidates (UMTC). (2 cr; A-F only; prereq Concurrent enrollment in AFEE 5111; fall, every year)
Designed to meet requirements of Minnesota statute requiring teachers receiving an initial license to have preparation in "scientifically-based reading instruction."

Early Childhood Education (ECE)

ECE 2100. Child Development and Learning. (3 cr; A-F only; fall, spring, every year)
Child development and learning; prenatal through middle childhood from research, theory, and practitioner perspectives. Physical, cognitive, linguistic, emotional, and social (including cultural) domains. Field experiences.

ECE 2300. Introduction to Early Childhood Education. (3 cr; A-F only; prereq Completion of Pre-Professional Skills Test [PPST]; Minimum GPA of 2.5; fall, every year)
Philosophical, historical, pedagogical, societal, institutional foundations of infant/toddler, preprimary, primary grade education. Efforts of modern programs to adapt instruction to developmental levels and experience backgrounds of young children and to work in partnership with parents. Field experience.

ECE 3410. Learning Environments for Infants and Toddlers. (4 cr; A-F only; prereq 2100, Ed 3110, minimum GPA of 2.5; spring, every year)
Designing, organizing, and maintaining learning environment. Arrangement of physical setting, provision of materials, construction of curriculum, implementation of learning experiences. Assessment of child's learning and of teaching/learning environment. Field Experiences.

ECE 3420. Nurturing and Collaborative Relationships for Infants and Toddlers. (3 cr; A-F only; prereq 2100; spring, every year)
Understanding/applying practices to promote emotional/social development in infancy/toddlerhood. Principles of caregiving. Relationship to teaching/learning environment. Developmentally appropriate guidance, collaborative parent/staff relationships, respecting family/cultural values/experiences.

ECE 3804. Individual Studies. (1-3 cr [max 6 cr]; prereq Jr, instructor consent; fall, spring, every year)
Topic related to student's major and not covered in regularly offered courses.

ECE 3901. The Professional Teacher I. (.5 cr; A-F only; prereq GPA of at least 2.50; fall, spring, every year)
Role of student teacher in planning for full-time teaching. Orientation to student teaching handbook with related assignments. Development of standards based student teaching notebook.

ECE 3902. The Professional Teacher II. (.5 cr; A-F only; prereq 3901; fall, spring, every year)
Completion/evaluation of professional standards-based portfolio, teacher licensure application. Taken concurrently with last student teaching experience.

ECE 4440. Infant and Toddler Student Teaching. (4 cr; A-F only; prereq 3410, 3420, 4750, 3901, minimum GPA of 2.50; fall, spring, summer, every year)
Students integrate theory/practice as member of teaching team. Portfolio-based student-teaching experience. Focuses on selected BOT competencies/indicators. University approved classroom placement.

Course Abbreviations
Prereqcourse prerequisites
crcredit
equivequivalent
fr, soph, jr, srfreshman, sophomore, junior, senior
=Credit will not be granted for the course if credit has been received for the course(s) listed in brackets following this symbol.
,In prerequisite listings, a comma means "and."

A prerequisite course listed by number only (e.g., prereq 3322) is in the same department as the course being described.

Courses beginning with 09 cannot be used for credit toward graduation or transfer.

Course Numbers

- Oxxx**....Courses that do not carry credit toward any University degree.
- 1xxx**.....Courses primarily for undergraduate students in their first year of study.
- 2xxx**.....Courses primarily for undergraduate students in their second year of study.
- 3xxx**.....Courses primarily for undergraduate students in their third year of study.
- 4xxx**....Courses primarily for undergraduate students in their fourth year of study.
- 5xxx**.....Courses primarily for graduate students; undergraduate students in their third or fourth year may enroll in such courses.

Term Offered

A notation following course prerequisites indicates what term the course is offered (fall, spring, May session, or summer), and whether the course is offered every year, or in even or odd years.

Abbreviations in parentheses following a course name indicate the university that offers the course:

- UMTC**....University of Minnesota, Twin Cities
- NDSU**.....North Dakota State University

ECE 4500. Young Children With Special Needs. (3 cr; A-F only; prereq 3410, 4700, Ed 3201, minimum GPA of 2.5; spring, every year)

Introduction to teaching young children with special needs. Important aspects of teaching in special-education/inclusive settings. Students interrelate experiences working with children with developing an educational philosophy.

ECE 4700. Creative Arts and Language Arts: Preprimary.

(4 cr; A-F only; prereq 2100, 2300, ED 3110 or concurrent enrollment, minimum GPA of 2.50; fall, every year)
Theory/practice related to preprimary (preschool, kindergarten) education. Development related to learning environment, curriculum, and teaching methods. Developmentally appropriate approaches to subject matter in language arts, literacy, and expressive arts. Field experiences.

ECE 4702. Mathematics, Social Studies, and Sciences: Preprimary.

(4 cr; A-F only; prereq 4700; spring, every year)
Theory/practice relation to preprimary education (preschool, kindergarten). Development related to learning environment, curriculum, and teaching methods. Developmentally appropriate approaches to subject matter in mathematics and in physical/social sciences.

ECE 4730. Understanding and Supporting Parenting. (3 cr;

A-F only; prereq 2300, 3420, concurrent enrollment in Ed 3110, minimum GPA of 2.5; fall, every year)
Parent-child relationships, adult development, family systems theory, parental authority, child compliance, developmental interaction during child rearing years. Parenting in diverse family configurations, in diverse cultures/lifestyles, and in high-risk families. Emphasizes knowledge of research for application.

ECE 4750. Family, School, and Community Relations. (3 cr;

A-F only; prereq 4730, minimum GPA of 2.5; fall, every year)
Emphasizes family involvement as essential to successful education. Patterns in family-school relations, trends, problems that inhibit parent involvement, strategies for productive family involvement. Community/cultural considerations.

ECE 4811. Preprimary Student Teaching I. (6 cr; A-F only;

prereq 3901, 4702, 4750, ED 3110, minimum GPA of 2.50; fall, spring, summer, every year)
Students integrate theory/practice as member of teaching team. Portfolio-based student-teaching experience. Selected BOT competencies and indicators. University approved classroom placement in preschool-aged setting.

ECE 4812. Preprimary Student Teaching II (K). (4 cr; A-F only;

prereq 3901, 4702, 4750, Ed 3110, minimum GPA of 2.5; fall, spring, every year)
Students integrate theory/practice as member of teaching team. Portfolio-based student-teaching experience. Focuses on selected BOT competencies/indicators. University approved classroom placement in a kindergarten classroom.

ECE 4880. Administration of Early Childhood Programs. (3

cr; A-F only; prereq 3410, 4700, 4750, minimum GPA of 2.50; fall, every year)
Application of developmental theory and management processes and tasks. Organizational, personnel, and fiscal management; educational programming; health and safety regulations and practices.

Economics (ECON)

ECON 1010. Global Trade Economics. (3 cr; fall, every year)

Overview of ecological/demographic/economic factors influencing current agricultural, industrial, and environmental development issues in every world region.

ECON 1111. Personal Economics. (3 cr; fall, every year)

Strategies, techniques, and resources for managing/planning personal finances. Budgeting, investments, housing, insurance, taxation. Credit, its use. Job selection, planning for retirement, installment buying.

ECON 2101. Microeconomics. (3 cr; prereq MATH 0991 or 2

hrs high school algebra or equiv; fall, spring, every year)
Basic economic principles of pricing, resource allocation, and consumption. Supply/demand, cost of production, consumer behavior. Competition and influences of market structure.

ECON 2102. Macroeconomics. (3 cr; prereq ECON 2101;

fall, spring, every year)
“Big picture” of economy. Determinants of national income, national income accounting, unemployment, inflation, economic growth. Classical, Keynesian, and more recent theoretical approaches to modifying economic activity. Monetary/fiscal policies. International economic relations.

Education (ED)

ED 2200. Foundations of Education. (3 cr; A-F only; prereq

Completion of Pre-Professional Skills Test [PPST]; Minimum GPA of 2.5; fall, every year)
Roles, responsibilities, duties, functions, routines, requirements of public school teachers. Historical, social, political foundations of public education. Role of education in a pluralistic society. Issues affecting education in American public schools.

ED 2877. Social Studies and Sciences in the Primary

Grades. (3 cr; A-F only; prereq Minimum GPA of 2.50; spring, every year)
Concepts/tools for teaching science and social studies as inquiry through a constructivist approach.

ED 3000. Cultural Immersion. (1 cr [max 3 cr]; A-F only; fall,

spring, summer, offered when feasible)
Three to five days in a school setting that primarily serves minority children/families. Students observe, participate, and teach mini-lessons. Interview teachers. Demonstrate understanding of cultural and community diversity and how to incorporate children’s experiences and culture into instruction.

ED 3010. Child Guidance and Classroom Management. (3

cr; A-F only; prereq 2200, ECE 2100, GPA of at least 2.50; fall, every year)
Theories, principles, and practices of child guidance and managing classrooms. Social/emotional competence of children/students. Peer relations and violence prevention.

ED 3110. Educational Psychology. (3 cr; A-F only; prereq

2200, ECE 2100, minimum GPA of 2.5; spring, every year)
Teaching/learning process: (1) planning/effective instruction; (2) behavioral/cognitive views. Emphasizes how learning is affected by development, individual differences, motivation.

ED 3201. Reading and Language Arts I. (4 cr; A-F only;

prereq 3110, ECE 4700, GPA of at least 2.50; spring, every year)
Instructional principles, standards, practices, and curriculum materials for becoming an effective teacher of literacy in elementary classrooms. At least ten hours of observing, assisting, and teaching literacy.

ED 3202. Reading and Language Arts II. (2 cr; prereq 3201;

fall, every year)
Assessment tools and practices to plan and evaluate effective reading instruction; professional development as a career-long effort and responsibility regarding effective reading instructional practices. At least ten hours in a primary grade classroom.

ED 3301. Creating Meaning Through Literature and Arts. (4

cr; A-F only; prereq Minimum GPA of 2.50; fall, every year)
Course in children’s literature designed to prepare pre-service teachers to integrate literature, art, drama, dance/movement, and music throughout the curriculum from a constructivist view of learning. Field experiences.

ED 3860. Mathematics in Elementary Education. (1 cr;

prereq 2200, minimum GPA of 2.50; fall, every year)
Mathematics content matter for elementary school teaching. Four strands for primary grades: number and operation, algebra, geometry and measurement, and data analysis.

ED 3870. Mathematics in the Primary Grades. (3 cr; A-F

only; prereq 3110, 3860, concurrent enrollment in ECE 4702, minimum GPA of 2.50; spring, every year)
Theory, curriculum, methods for teaching developmentally appropriate mathematics to children in primary grades (first - fourth grade level). At least 10 hours of observing/assisting in first, second, or third grade classrooms with the expectation of teaching at least 2 math lessons.

ED 4827. Primary Student Teaching. (8 cr; A-F only; prereq 3110, 3201, 3301, 3870, 3877, ECE 3901, 4750, minimum GPA of 2.5; fall, spring, every year)

Students teach in public school classroom with guidance/supervision by University supervisors/assigned school personnel. Classroom placement in first, second, or third grades. Portfolio-based student teaching experience. Focuses on selected INTASC/BOT indicators.

Educational and Human Development (EDHD)

EDHD 5001. Learning, Cognition, and Assessment in the Schools (UMTC). (3 cr; spring, offered when feasible)

Learning, cognitive development, classroom management, motivation, instruction, assessment. Behaviorism, cognitive/social constructivism, human information processing theory. Intelligence, knowledge acquisition, reasoning, scholastic achievement, standardized testing, reliability, validity, evaluation, performance assessment, portfolios, demonstrations. Applications to instruction/organization of curricular materials.

EDHD 5003. Developmental and Individual Differences in Educational Contexts (UMTC). (2 cr; spring, every year)

Overview of developmental/individual differences of children/adolescents in educational contexts. Emphasizes dynamic systems perspective. Developmental transitions. Interactions between student, environment, task. Accommodations/adaptations for students in special education.

EDHD 5004. Teaching Students with Special Needs in Inclusive Settings (UMTC). (2 cr; prereq 5003; spring, every year)

Exceptionalities in educational settings as defined in federal/state rules/regulation. Historical perspectives, definitions, etiology, needs, characteristics. Service delivery systems for each exceptionality.

EDHD 5005. School and Society (UMTC). (2 cr; spring, every year)

Readings in history, philosophy, social sciences, law that reveal diverse educational values in a pluralistic society. Multiple expectations of schools. Civil liberties, rights, community. Varying cultural backgrounds of students, family circumstances, exceptional needs.

EDHD 5007. Technology for Teaching and Learning (UMTC). (1.5 cr; spring, every year)

Diverse educational technology in K-12 classrooms. Effective use of technology. Computer technologies to stimulate personal productivity/communication, enhance teaching/learning processes.

EDHD 5009. Human Relations: Applied Skills for School and Society (UMTC). (1 cr; spring, every year)

Issues of prejudice/discrimination in terms of history, power, social perception. Knowledge/skills acquisition in cooperative learning, multicultural education, group dynamics, social influence, leadership, judgment/decision making, prejudice reduction, conflict resolution, teaching in diverse educational settings.

Educational Policy and Administration (EDPA)

EDPA 5341. American Middle School (UMTC). (3 cr; fall, every year)

Uniqueness of the early adolescent. Appropriate learning situations for educators working with middle-level students.

English as a Second Language (ESL)

ESL 101. High-Beginning English Grammar. (0 cr; prereq IBT score of at least 32 or permission of ESL coordinator; fall, spring, summer, every year)

Review/practice. Simple tenses (present, past, future). Present perfect, present progressive, interrogative, negative formation. Modal verbs, frequency adverbs. Pronouns, noun phrase formation. Comparatives/superlatives.

ESL 111. High-Beginning ESL Speaking and Listening. (0 cr; prereq IBT score of at least 32 or permission of ESL coordinator; fall, spring, summer, every year)

Basic pronunciation and listening comprehension, from phonemic level toward short-conversation level. Bottom-up (phonemic, sentential) and top-down (situational, functional-notional, topical) approaches.

ESL 121. High-Beginning ESL Writing. (0 cr; prereq IBT score of at least 32 or permission of ESL coordinator; fall, spring, summer, every year)

Sentence composition, paragraph development. Sentence/paragraph structures, topic sentence, supporting/concluding sentences. Types of paragraphs (definition, descriptive, opinion, narrative, etc.).

ESL 131. High-Beginning ESL Reading and Vocabulary. (0 cr; prereq IBT score of at least 32 or permission of ESL coordinator; fall, spring, summer, every year)

Sentence/paragraph reading comprehension, active vocabulary building through contexts. Analysis of sentence structures. Identification of topic, main idea, and supporting details. Unity/coherence through transitions, words, and ideas.

ESL 201. Intermediate English Grammar. (0 cr; prereq 101 or permission of ESL coordinator; fall, spring, summer, every year)

Review/practice. Simple tenses, aspects. Dependent clauses, passivization, comparatives/superlatives, infinitives/gerunds, noun phrase structures, participial phrases.

ESL 211. Intermediate ESL Speaking and Listening. (0 cr; prereq 111 or permission of ESL coordinator; fall, spring, summer, every year)

Communicative practice of tenses/modals. Pronunciation rules (e.g., linking, contractions, intonation). Comprehension of and discussion about long conversations and short lectures. Structural/functional aspects of English.

ESL 221. Intermediate ESL Writing. (0 cr; prereq 121 or permission of ESL coordinator; fall, spring, summer, every year)

Paragraph development, short essay writing. Punctuations rules. Introductory paragraphs (attention getter, topic sentence, guide). Concluding paragraphs (summary, evaluation, prediction). Short essays (compare/contrast, cause/effect, classification).

ESL 231. Intermediate ESL Reading and Vocabulary. (0 cr; prereq 131 or permission of ESL coordinator; fall, spring, summer, every year)

Strategic reading comprehension skills (e.g., finding main ideas, supporting materials, making inferences, summarizing, using context) of short essays. Active vocabulary building through context/etymology.

ESL 301. High-Intermediate English Grammar. (0 cr; prereq 201 or permission of ESL coordinator; fall, spring, summer, every year)

Dependent clauses, their reductions. Quantification of noun phrases. Unreal tenses/subjunctives. Causative/sensory verbs. Clausal/phrasal connections. Continues structures from 0201.

ESL 311. High-Intermediate ESL Speaking and Listening. (0 cr; prereq 211 or permission of ESL coordinator; fall, spring, summer, every year)

Note-taking skills. Comprehension of long lectures. Practice of communicative skills necessary for debates, group discussions, and public presentations.

ESL 321. High-Intermediate ESL Writing. (0 cr; prereq 221 or permission of ESL coordinator; fall, spring, summer, every year)

Full essay writing. Coherence/unity. Process essays. Comparison/contrast essays. Cause/effect essays. Opinion/argumentative essays. Classification essays. Reactions essays.

ESL 331. High-Intermediate ESL Reading and Vocabulary. (0 cr; prereq 231 or permission of ESL coordinator; fall, spring, summer, every year)

Critical reading skills. Speed reading. Vocabulary building for academic disciplines. Practice in strategic reading comprehension skills.

Course Abbreviations

Prereq	course prerequisites
cr	credit
equiv	equivalent
fr, soph, jr, sr	freshman, sophomore, junior, senior
=	Credit will not be granted for the course if credit has been received for the course(s) listed in brackets following this symbol.
,	In prerequisite listings, a comma means "and."

A prerequisite course listed by number only (e.g., prereq 3322) is in the same department as the course being described.

Courses beginning with 09 cannot be used for credit toward graduation or transfer.

Course Numbers

- Oxxx**....Courses that do not carry credit toward any University degree.
- 1xxx**.....Courses primarily for undergraduate students in their first year of study.
- 2xxx**.....Courses primarily for undergraduate students in their second year of study.
- 3xxx**.....Courses primarily for undergraduate students in their third year of study.
- 4xxx**....Courses primarily for undergraduate students in their fourth year of study.
- 5xxx**.....Courses primarily for graduate students; undergraduate students in their third or fourth year may enroll in such courses.

Term Offered

A notation following course prerequisites indicates what term the course is offered (fall, spring, May session, or summer), and whether the course is offered every year, or in even or odd years.

Abbreviations in parentheses following a course name indicate the university that offers the course:

- UMTC** University of Minnesota, Twin Cities
- NDSU**.....North Dakota State University

Entrepreneurship (ENTR)

- ENTR 2200. Introduction to Entrepreneurship and Small Business.** (3 cr; fall, spring, summer, every year)
Entrepreneurship and the economy. Traits/skills of entrepreneurs, opportunities in entrepreneurship, legal forms of business establishment, self-analysis/fitness for entrepreneurship.
- ENTR 3200. Business Plan Development.** (3 cr; =[AGEC 4760]; prereq MGMT 3100, 3200, MKTG 3300; fall, every year)
Business start-up/development phase. Planning related to opportunity recognition, product development, marketing, and financing. Students research/write a basic business plan.
- ENTR 3400. Entrepreneurial and Small Business Finance.** (3 cr; prereq MGMT 3100; spring, even years)
Start-up/expansion financing, requirements for economic development groups. SBA loan guarantees, venture capitalists, small business valuation techniques. Cessation, related tax planning strategies.
- ENTR 4100. Entrepreneurial Marketing.** (3 cr; prereq MKTG 3260; spring, odd years)
Opportunities in international expansion/development, including import-export and franchising. International risk assessment, financial/legal implications, cultural issues.
- ENTR 4200. Field Studies in Entrepreneurship and Small Business.** (3 cr; prereq 3200, 3400; fall, odd years)
Students, in tandem with faculty adviser, consult with local small business or entrepreneurs to solve problems or capitalize on new opportunities. Guest speakers provide insight on philosophies/practices.
- ENTR 4800. Entrepreneurship and Small Business Strategies.** (3 cr; =[MGMT 4800]; prereq 3200, 3400; spring, every year)
Capstone course. Students prepare/present comprehensive business plan for entrepreneurial venture, including comprehensive financials, marketing plan, business formation and management plan, and growth strategy.

Environmental Science (ENSC)

- ENSC 3804. Individual Studies.** (1-4 cr [max 12 cr]; prereq Instructor consent; fall, spring, summer, every year)
Topics in environmental sciences not covered by the program courses.

Equine Science (EQSC)

- EQSC 1000. Light Horse Driving.** (2 cr; spring, every year)
Types of driving vehicles and harness, including fine harness, heavy harness, and competitive driving. Hitching/driving the fine harness horse. Techniques for training the fine harness horse to drive. Negotiating obstacles while driving.
- EQSC 1002. Equine Careers and Husbandry Practices.** (1 cr; fall, every year)
Technical knowledge and practical experience needed for where students want to be in that industry.
- EQSC 1100. Western Equitation.** (3 cr; fall, spring, every year)
Grooming, handling, safety, identification of equipment, saddling, mounting, correct body position (equitation), cues and their proper use, various riding techniques. Focus on developing proper equitation skills and techniques for riding and showing.
- EQSC 1200. Hunt Seat & Dressage Equitation.** (3 cr; fall, spring, every year)
Developing hunt seat skills and techniques, including how to ride a course of jumps. "Centered riding" techniques. Basic dressage maneuvers and riding lower-level dressage tests.
- EQSC 1202. Equine Evaluation.** (2 cr; spring, every year)
Conformation, breed characteristics, and type and their importance in evaluation. Performance evaluation, criteria, and scoring methods. Preparation and delivery of oral reasons.
- EQSC 1300. Saddle Seat Equitation.** (3 cr; prereq 1100 or 1200 or instructor consent; fall, every year)
Saddling, mounting, seat/hands, other saddle seat techniques. Developing equitation skills for saddle seat riding/showing.
- EQSC 1803. Directed Studies.** (1-3 cr [max 6 cr]; prereq Instructor consent; fall, spring, summer, every year)
Current topics not covered in regularly offered courses.
- EQSC 2001. Concepts in Dressage Equitation.** (3 cr; prereq 1200 or instructor consent; spring, every year)
Developing a balanced, classical seat for riding. Dressage techniques, riding a test, collection, advanced maneuvers. Refining skills to develop a supple, obedient horse.
- EQSC 2102. Horse Production.** (4 cr; prereq ANSC 1004; fall, every year)
Fundamentals of horse care. Equine nutrition, behavior, diseases. Hoof care. First aid, health care, disease prevention. Parasites.
- EQSC 2112. Riding Instructor Training.** (2 cr; prereq Any two of the following: EQSC 1100, EQSC 1200, EQSC 1300; fall, spring, every year)
Formulating lesson plans. Teaching methods for individuals or group. Safety, insurance, liability, management. Student's teaching methods are evaluated.
- EQSC 2202. Advanced Equine Evaluation.** (1 cr [max 3 cr]; prereq 1202 or instructor consent; fall, every year)
Advanced equine evaluation techniques. Judging of halter/performance events. Preparation/delivery of oral reasons.
- EQSC 3305. Equine Reproductive Techniques.** (3 cr; prereq 2101, ANSC 3203, 3304 or instructor consent; spring, every year)
Breeding management practices/techniques. Gestation, fetal development, endocrinology, estrus manipulation, artificial insemination, embryo transfer, cooled and cryopreservation of semen, teasing, and foaling. Lab emphasizes skills required in equine industry. Lecture emphasizes reproductive theory.
- EQSC 3403. Equine Exercise Physiology.** (3 cr; prereq ANSC 3203, EQSC 2102; spring, every year)
Skeletal, muscular, cardiovascular, and regulatory systems of the horse. Effect of work-related stress (mental and physical) using physiological measures and how the systems relate to one another; how various types of conditioning can affect the systems separately and as a whole.
- EQSC 3413. Horse Training and Showing.** (3 cr [max 6 cr]; prereq 6 cr of equitation courses [from 1100, 1200, 1300, 3441, 3442, 3443], [3412 or concurrent enrollment in 3412]; fall, spring, every year)
Work with untrained young horse or older show horse to correct problems or maintain the horse.
- EQSC 3441. Topics in Advanced Western Equitation.** (3 cr; prereq 1100 or instructor consent; spring, every year)
Experience in reining maneuvers. Students refine skills.
- EQSC 3443. Topics in Advanced Equitation Over Fences.** (3 cr; prereq 1200 or instructor consent; fall, every year)
Experience in riding more challenging course of jumps.
- EQSC 3804. Individual Studies.** (1-3 cr [max 6 cr]; prereq Jr, instructor consent; fall, spring, summer, every year)
Topic related to student's major not covered in regularly offered courses.
- EQSC 4102. Equine Management.** (3 cr; prereq ECON 1101; spring, every year)
Fundamentals of horse management. Record keeping (traditional, computer based). Marketing, sales techniques. Legal aspects (e.g., contracts, zoning, liability, insurance). Management project that involves establishing, maintaining, improving an equine business.

Foreign Study (FOST)

- FOST 3201. Study Abroad (UMC).** (1-18 cr [max 36 cr]; prereq Approval of Learning Abroad Center; fall, spring, summer, every year)
Study abroad programs/courses approved by and offered through UMC.
- FOST 3205. Study Abroad (Outside Program).** (1-18 cr [max 36 cr]; prereq Approval of Learning Abroad Center; fall, spring, summer, every year)
Study abroad programs/courses reviewed by UMC but offered through an outside organization.

General Agriculture (GNAG)

GNAG 1012. Introduction to Applied Agricultural Chemistry. (2 cr; prereq CHEM 1001 or [concurrent enrollment in CHEM 1001, instructor consent]; fall, every year)

Common chemical processes, their application to production agriculture. Application of pH in soil/feed systems. Dilution principles, units of weights/measures. Basic applied theories used in agriculture.

GNAG 1803. Directed Studies. (1-3 cr [max 6 cr]; prereq Instructor consent; fall, spring, summer, every year)
Current topics not covered in regularly offered courses.

GNAG 2899. Pre-Internship Seminar. (.5 cr; A-F or audit; fall, every year)
Expectations/responsibilities of internships. Preparing for a job search. Presentations about internship experiences by those who have recently completed 3900. Discussions between students, staff, and invited guests.

GNAG 3203. Ag Products and Processing. (3 cr; prereq Jr; spring, summer, every year)
Survey of raw agricultural products produced in Upper Midwest. Transport, processing, packaging, wholesale/retail distribution and sales. Quality factors, food laws/regulations, sanitation, food safety, environmental concerns.

GNAG 3204. International Agricultural Production, Processing, and Marketing. (3 cr; spring, every year)
Survey of international agricultural production. Transport, processing, packaging, wholesale/retail distribution, marketing. Quality factors, food laws/regulations, sanitation, food safety, and environmental concerns.

GNAG 3804. Individual Studies. (1-3 cr [max 6 cr]; prereq Jr, instructor consent; fall, spring, summer, every year)
Topic related to student's major not covered in regularly offered courses.

GNAG 3899. Pre-Internship Seminar. (.5 cr; A-F or audit; fall, every year)
Expectations/responsibilities of internships. Preparing for a job search. Presentations about internship experiences by those who have recently completed 3900. Discussions between students, staff, and invited guests.

GNAG 3900. Internship. (.5-3 cr [max 3 cr]; A-F or audit; prereq 3899, [soph or sr]; fall, spring, summer, every year)
Supervised professional work experience in agricultural business, governmental agency. Report/consultation with faculty adviser/employer.

GNAG 3901. Post Internship Seminar. (.5 cr; A-F or audit; prereq GNAG 3900; fall, every year)
Student who have recently completed internships prepare/deliver a PowerPoint presentation of experience/knowledge gained. Discussions between post/pre-internship students, staff, and invited guests.

GNAG 4652. Senior Seminar. (1 cr; A-F only; prereq Sr or instructor consent; fall, spring, every year)
Survey of current literature. Preparation/delivery of special topics. Preparation of abstracts, papers, and visual aids. Evaluation of seminars. Use of library and other resources, including computer information search. Use of new technology.

General Business (GBUS)

GBUS 1005. Orientation to Online Programs. (1 cr; fall, spring, summer, every year)
Introduction to UMC policies, email, virtual private network, online library resources, writing scholarly reports, APA referencing, netiquette, networking in an online environment, group work in an online environment.

GBUS 1007. Students in Free Enterprise. (1 cr; S-N only; fall, spring, every year)
SIFE club students use club rule guidelines to evaluate contributions that lead to credit.

GBUS 1603. Principles of Insurance. (3 cr; spring, every year)
Principles and fundamentals of insurance of various types, risk of retailing, managing retail risks, buying insurance, handling claims.

GBUS 1803. Directed Studies. (1-3 cr [max 6 cr]; prereq Instructor consent; fall, spring, summer, every year)
Current topics not covered in regularly offered courses.

GBUS 1981. Internship Seminar. (1 cr; spring, every year)
Planning for securing and successfully completing an internship. Internship policies and objectives; samples of forms.

GBUS 3107. Legal Environment in Business. (3 cr; A-F or audit; fall, spring, summer, every year)
Fundamental concepts of business law, with emphasis on the legal system, contracts, bailments, agency, business organizations, and the fundamentals of commercial law.

GBUS 3117. Business Law. (3 cr; prereq 3107; spring, every year)
Negotiable instruments, bank deposits/collection, bankruptcy, suretyship, partnerships, corporations, federal securities law, accountant's legal liability, property, insurance, trust, estates.

GBUS 3190. Topics in Business. (1-3 cr [max 6 cr]; fall, spring, summer, every year)
May include varied emerging topics in business.

GBUS 3300. Business Analytics. (3 cr; prereq MATH 1150; spring, offered when feasible)
Introduction to business analytics encompassing extensive use of data, statistical, and quantitative analysis, exploratory and predictive modeling, for fact-based management decisions and actions.

GBUS 3500. Business Ethics. (3 cr; prereq MGMT 3200 and MKTG 3300 or instructor consent; fall, spring, every year)
Ethics as a compelling responsibility of today's business organizations. Moral principles/models for ethical decision making. Challenges of ethical business practices.

GBUS 3804. Individual Studies. (1-3 cr [max 6 cr]; prereq Jr, instructor consent; fall, spring, summer, every year)
Topic related to student's major not covered in regularly offered courses.

General Education (GNED)

GNED 1000. Seminar for New Students. (2 cr; prereq Recommended for first semester on campus; fall, spring, every year)
Assists students in transition from high school to college-level academics. Interactive environment. Knowledge and strategy skills for academic success.

GNED 1803. Directed Studies. (1-3 cr [max 6 cr]; prereq Instructor consent; fall, spring, summer, every year)
Current topics not covered in regularly offered courses.

GNED 1900. Chancellor's Academic Success Seminar. (.5 cr; prereq Student must be on academic contract; fall, spring, every year)
Comprehensive study program to help strengthen learning skills. Includes some monitoring of contract requirements.

GNED 3000. Global Seminar. (1-3 cr [max 6 cr]; summer, every year)
Interdisciplinary approach to a specific culture and its current local/global issues. In-depth experiences in a discipline area of student's choice. Required international travel for one to three weeks, led by a faculty member.

GNED 3804. Individual Studies. (1-3 cr [max 6 cr]; prereq Jr, instructor consent; fall, spring, summer, every year)
Topic related to student's major not covered in regularly offered courses.

GNED 3809. Teaching and Learning Assistance. (1 cr [max 4 cr]; prereq Jr, instructor consent, minimum GPA 3.00 in subject matter; fall, spring, offered when feasible)
Skills/techniques in disciplinary content associated with college teaching. Supervised by faculty monitor and site supervisor.

Course Abbreviations

Prereqcourse prerequisites
crcredit
equivequivalent
fr, soph, jr, srfreshman, sophomore, junior, senior
=Credit will not be granted for the course if credit has been received for the course(s) listed in brackets following this symbol.
,In prerequisite listings, a comma means "and."

A prerequisite course listed by number only (e.g., prereq 3322) is in the same department as the course being described.

Courses beginning with O9 cannot be used for credit toward graduation or transfer.

Course Numbers

- 0xxx**....Courses that do not carry credit toward any University degree.
- 1xxx**.....Courses primarily for undergraduate students in their first year of study.
- 2xxx**.....Courses primarily for undergraduate students in their second year of study.
- 3xxx**.....Courses primarily for undergraduate students in their third year of study.
- 4xxx**Courses primarily for undergraduate students in their fourth year of study.
- 5xxx**.....Courses primarily for graduate students; undergraduate students in their third or fourth year may enroll in such courses.

Term Offered

A notation following course prerequisites indicates what term the course is offered (fall, spring, May session, or summer), and whether the course is offered every year, or in even or odd years.

Abbreviations in parentheses following a course name indicate the university that offers the course:

- UMTC**University of Minnesota, Twin Cities
- NDSU**.....North Dakota State University

Geography (GEOG)

GEOG 1104. World Regional Geography. (3 cr; fall, spring, every year)

Theme of socioeconomic development, broadly defined, used to organize and present a variety of geographic concepts in relationship to selected major regions of the world. By using a geographic perspective in the study of cultures, development, and human-environment interaction, the course concerns itself with who has what, where, and how.

Geology (GEOL)

GEOL 1001. Introductory Geology. (3 cr; A-F or audit; fall, spring, every year)

Survey of Earth, including its composition, structure, and dynamics; internal and surface processes related to theories of sea floor and continental movement; summary of geological history and development of life.

Health (HLTH)

HLTH 1062. First Aid and CPR. (2 cr; fall, spring, every year)

American Red Cross course that follows guidelines set by the ARC and UMC for certification and grading. Prepares students to carry out the Emergency Action Principles and grants certification in Responding to Emergencies (an inclusive first aid and CPR course) if the ARC standards are successfully met.

Health Informatics (HI)

HI 2060. Database Management in Health Information Systems. (3 cr; fall, every year)

Fundamentals of health information database design and development. Common aspects of many health information database management systems. How to write business rules; model and implement databases; and write transactions. Database mechanisms that aid in securing data.

HI 3020. Introduction to Health Information Systems. (3 cr; fall, every year)

Information systems applied to the health care industry. How information is collected, stored, retrieved, shared, and analyzed, along with the legal and ethical concerns inherent in the stewardship of patient information. Work flow, electronic health records, and personal health records.

HI 3060. Secure Data Collection and Retrieval. (3 cr; prereq 2060 or SE 2060; spring, every year)

Data manipulation in the health care industry. Secure data collection techniques and tools; data encoding; resolving data conflicts; data cleaning; decision support systems; data evolution; data measures; secure data retrieval techniques; reporting applications; and data analysis techniques.

HI 3100. Health Information Workflow Process Analysis and Design. (3 cr; prereq 3020; spring, every year)

Workflow processes in the health organizations. How to model workflows using formal/semi-formal diagramming notations. How processes can change over time/strategies for managing change. Information architectures, workflow components; interoperability in service oriented architectures.

HI 3200. Social, Legal, Ethical Issues in Health Informatics. (3 cr; fall, every year)

Social, legal, and ethical issues associated with collection, using, sharing, and stewardship of electronic medical records. Responsibilities of and impacts on health information professionals and health organizations. Social impacts of meaningful use of electronic medical records.

HI 3215. Health Information Assurance and Security. (3 cr; spring, every year)

Information assurance as it relates to legal responsibilities, including HIPAA, Sarbanes-Oxley, HITECH, and Digital Rights Management. Strategies and process models for securing information. Information assurance and security industry standards such as ISO 17799 and COBIT. Use of software tools to aid in protecting data.

HI 3300. Organization of EHR Systems. (3 cr; spring, every year)

Architectures, organization, data structures and features. Analysis and design patterns. Nonfunctional requirements and solutions. Constraints of EHR systems development such as security, interoperability, government, and certification. Application of XML, XMI, SOA, and RM-ODP.

Health Science (HSCI)

HSCI 1072. Wellness. (3 cr; fall, every year)

Students develop a personal wellness plan.

HSCI 1123. Fundamentals of Nutrition. (3 cr; fall, spring, summer, every year)

Fundamentals of nutrition and metabolism, including carbohydrates, proteins, fats, minerals, vitamins, and water. Assessment of health risks, health promotion, and disease prevention.

HSCI 3804. Individual Studies. (1-3 cr [max 3 cr]; fall, spring, summer, every year)

Individualized study, related to student's interest, in health care topic not covered in regular courses.

HSCI 3899. Pre-Internship Seminar. (.5 cr; spring, every year)

Expectations/responsibilities of internship. Preparing for graduate or professional school application or a job search. Presentations about internship experiences by those who have recently completed 3900 (internship). Discussions between students, staff, and invited guests.

HSCI 3900. Internship. (1-2 cr [max 2 cr]; prereq 3899; fall, spring, summer, every year)

Supervised professional work experience in health care facility. Report/consultation with faculty adviser/employer.

HSCI 3901. Post-Internship Seminar. (.5 cr; prereq 3900; spring, every year)

Students who have recently completed internships prepare/deliver a PowerPoint presentation of experience/knowledge gained. Discussions between post/pre-internship students, staff, and invited guests.

HSCI 4301. Capstone: Problem Solving in Health Care Teams. (1 cr; spring, odd years)

Interdisciplinary approaches to patient care and public health issues. Case studies.

Health Systems Management (HSM)

HSM 1010. Medical Terminology. (2 cr; fall, spring, every year)

Prefixes, suffixes, and roots used to compose medical terms. Pronouncing and defining terminology related to body structure, disease, diagnosis, and treatment.

HSM 1803. Directed Studies. (1-3 cr [max 6 cr]; prereq Instructor consent; fall, spring, summer, every year)

Current topics not covered in regularly offered courses.

HSM 2010. Introduction to Health Services Organizations. (2 cr; A-F or audit; fall, every year)

Major developments in the evolution of health care in the United States. Education and training of health care personnel. Service providers. Public, private, voluntary agency initiatives. Major stakeholders; rural and urban priorities.

HSM 3020. Quality Improvement and Risk Management. (4 cr; prereq 3100, 3200; spring, offered when feasible)

Quality assessment activities in health care facilities. Emphasizes case management, utilization review, patient care evaluation, risk management activities. Methodologies/strategies, including quantitative/qualitative analysis of data. Students generate or update a quality assurance plan.

HSM 3030. Health Care and Medical Needs. (2 cr; prereq HSM 1010; BIOL 1464; fall, spring, offered when feasible)

Common health conditions, diseases, disabilities. Intervention/treatment issues. Health care and medical needs across age continuum. Medical/pharmacologic terminology.

HSM 3100. Essentials of Managed Care. (3 cr; prereq HSM 2010; fall, spring, offered when feasible)

Major economic forces affecting U.S. health care delivery system. Methods for addressing access, cost, and quality. Types of managed care organizations, management control and governance structures, closed and open panels, contracting and reimbursement, carve outs, special market segments; Medicaid, Medicare; rural, urban populations.

HSM 3130. Health Management Information Systems. (3 cr; prereq ITM 1010; spring, summer, every year)

Data accumulation, storage, integration, manipulation, and presentation. Strategic uses of data. Information access/security, their relation to patient confidentiality.

HSM 3200. Health Care Leadership and Planning. (4 cr; prereq 2010; fall, every year)

Organizational management characteristics for modern health care settings. Management process/roles addressing resource allocation, delivery of clinical services, governance, patient satisfaction, and outcome evaluation.

HSM 3230. Administration of Continuum Care Facilities. (3 cr; fall, spring, every year)

Programs/services to meet the needs of an aging population. Physical, social, and psychological aspects of aging. Role, organization, function, and management characteristics of long-term health care facilities. Administrative structures, staffing, and changing work force. Governance, operations oversight.

HSM 3240. Health Care Policy and Comparative Systems. (4 cr; spring, every year)

Analysis/comparison of world health problems and delivery systems. Geographic, political, and economic relationships affecting health care system.

HSM 3804. Individual Studies. (1-3 cr [max 6 cr]; prereq Jr, instructor consent; fall, spring, summer, every year)

Topic related to student's major not covered in regularly offered courses.

HSM 3900. Internship. (1-3 cr [max 3 cr]; prereq 3200, 3230, 4210, 4212, instructor consent, internship plan approved by HSM program director; may be repeated in different health care setting; fall, spring, summer, every year)

Ten-week field experience under direction of a faculty member in a health care organization or agency. Students complete agency/organization assessment and major project.

HSM 4100. Health Care Finance. (3 cr; prereq Acct 2101, Acct 2102; spring, every year)

Finance structure of U.S. health care system. Reimbursement mechanisms. Financial information in management decision making. Financial planning/control. Analysis of financial statements/budgets in health care system.

HSM 4210. Health Care Law and Biomedical Ethics. (4 cr; prereq 3200; fall, spring, offered when feasible)

Legal/bioethical issues in health care management. Professional licensing, certification, and reporting. Liability, negligence, malpractice. Patient rights/responsibilities. Clinical outcomes assessment/measurement.

HSM 4212. Regulatory Management. (3 cr; prereq 3200; fall, spring, summer, offered when feasible)

Health care funding/reimbursement processes. Compliance/regulatory mechanisms. Federal/state surveys.

History (HIST)

HIST 1021. World Civilization I. (3 cr; fall, spring, every year)

Ancient Near East, Greece, Egypt, Rome, and Medieval Europe.

HIST 1022. World Civilization II. (3 cr; fall, spring, every year)

Renaissance and Modern Europe from Reformation to present.

HIST 1301. American History I. (3 cr; fall, every year)

Colonial era and early national period from the Revolution through the Civil War and Reconstruction.

HIST 1302. American History II. (3 cr; fall, spring, every year)

Gilded Age to present with emphasis on foreign involvements and wars, New Deal, civil rights, and economic developments.

HIST 3054. Topics in History. (3 cr [max 6 cr]; fall, spring, offered when feasible)

Topics of regional, national, or international importance, such as Minnesota history, U.S. Civil War, Japanese history.

Honors (HON)

HON 1010. Honors Symposium . (2 cr; prereq Admitted to honors or approval of instructor; fall, spring, every year)

Foundation for honors program. Independent thinking, writing, discussion, leadership, research skills within a global perspective. Critical thinking skills will be emphasized throughout the course.

HON 3010. Honors Option. (1 cr [max 6 cr]; prereq 1010; fall, spring, summer, every year)

Students work with faculty member to develop an extracurricular activity/project conducted concurrently with regular coursework. Coursework beyond the scope of regular course.

HON 3030. Honors Contract. (1 cr [max 6 cr]; prereq 1010; fall, spring, summer, every year)

Students work with faculty sponsor to organize other students into a group that discusses a common reading. Students are encouraged to take advantage of colloquia offered on campus.

HON 4010. Proposal for Honors Essay, Research, or Creative Project. (1 cr; prereq 1010, consent of [project adviser, director of honors]; fall, spring, every year)

Frequent meetings with academic adviser and director of honors to develop honors project proposal to fulfill final honors program requirements.

HON 4030. Honors Essay, Research, or Creative Project. (3 cr [max 6 cr]; prereq 4010, approval of [departmental head, director of honors]; fall, spring, summer, every year)

Guides student through process of research/preparation of documentation for dissemination at public defense. Discipline-specific work supervised by adviser to develop an original essay, research, or creative project.

Horticulture (HORT)

HORT 1010. Introduction to Horticulture. (3 cr; fall, spring, every year)

Environmental considerations, planting, propagation, pruning, and protection of horticultural crops. Greenhouse/field experience.

HORT 1021. Woody Plant Materials. (4 cr; A-F or audit; prereq 1010 or instructor consent; fall, every year)

Identification, ecology, and use of deciduous and evergreen trees, shrubs, and vines.

HORT 1025. Introduction to Arboriculture. (2 cr; fall, every year)

Applications in arboriculture. Tree biology, tree/soil/water relations, planting, pruning, worker safety, trees/urban interfaces, electrical hazards, plant health care, golf course tree maintenance. Climbing/felling techniques.

HORT 1091. Indoor Flowering and Foliage Plants. (2 cr; fall, odd years)

Identification, culture, and propagation of foliage plants used in interior decoration.

HORT 1092. Floral Design. (2 cr; spring, every year)

Principles for design related to floral arrangement, identification, use, and care of cut flowers common to florist industry.

HORT 1803. Directed Studies. (1-3 cr [max 6 cr]; fall, spring, every year)

Topics not covered in regularly offered courses.

HORT 3025. Applications in Arboriculture. (3 cr; prereq 1025; fall, every year)

Application of knowledge/techniques learned in introduction course. Students perform climbing, tree pruning, rigging applications, and tree felling. Safe work practices. Advanced pruning, fruit tree care. Disease/pest identification/management, cabling/bracing, lightning protection.

HORT 3030. Landscape Design. (4 cr; A-F only; prereq 1021; spring, every year)

Application of aesthetic, environmental, and functional design principles to creative planning/development of residential/commercial landscapes. Emphasizes low impact and sustainability.

Course Abbreviations

Prereq	course prerequisites
cr	credit
equiv	equivalent
fr, soph, jr, sr	freshman, sophomore, junior, senior
=	Credit will not be granted for the course if credit has been received for the course(s) listed in brackets following this symbol.
,	In prerequisite listings, a comma means "and."

A prerequisite course listed by number only (e.g., prereq 3322) is in the same department as the course being described.

Courses beginning with O9 cannot be used for credit toward graduation or transfer.

Course Numbers

- 0xxx**....Courses that do not carry credit toward any University degree.
- 1xxx**.....Courses primarily for undergraduate students in their first year of study.
- 2xxx**.....Courses primarily for undergraduate students in their second year of study.
- 3xxx**.....Courses primarily for undergraduate students in their third year of study.
- 4xxx**Courses primarily for undergraduate students in their fourth year of study.
- 5xxx**.....Courses primarily for graduate students; undergraduate students in their third or fourth year may enroll in such courses.

Term Offered

A notation following course prerequisites indicates what term the course is offered (fall, spring, May session, or summer), and whether the course is offered every year, or in even or odd years.

Abbreviations in parentheses following a course name indicate the university that offers the course:

- UMTC** University of Minnesota, Twin Cities
- NDSU**.....North Dakota State University

HORT 3031. Herbaceous Perennial Plant Materials. (2 cr; fall, odd years)
Identification, classification, ecology, and landscape uses of perennial flowers, bulbs, ground covers, and wildflowers.

HORT 3033. Commercial Floriculture Crops-Fall. (4 cr; prereq 1010; fall, every year)
Identification and culture of holiday pot plants and major cut flower crops. Soil preparation, artificial mixes, soil testing, applying soil test results; greenhouse pests, life cycle, control and management.

HORT 3034. Commercial Floriculture Crops-Spring. (4 cr; prereq 1010; spring, every year)
Fundamentals of greenhouse structure and management. Heating and cooling requirements, lighting photoperiod control, soil sterilization, production of winter grown greenhouse crops such as mums, azaleas, cineraria. Identification and culture of annual bedding plants. Wholesale production, use of annual flowers in residential and commercial landscape design.

HORT 3036. Plant Propagation. (4 cr; prereq 1010, BIOL 2022; spring, every year)
Plant propagation techniques for the commercial and home propagator. Mist system construction and operation. Propagation of plants by tissue culture, seed, cutting, layering, grafting, and division.

HORT 3040. Landscape Installation and Maintenance. (3 cr; fall, every year)
Applied horticulture practices in planting landscape materials, installing hardscapes, and maintaining residential/commercial landscapes. Proper use/maintenance of equipment. Emphasizes environmental/sustainability considerations.

HORT 3045. Urban Forestry Planning and Management. (3 cr; prereq 3025; spring, every year)
Tree management for municipal forester. Tree planning/planting for city streets. Right of way pruning, management techniques, electrical hazard awareness, risk assessment/removals. Research papers, group exercises.

HORT 3093. Advanced Floral Design and Florist Operations. (2 cr; prereq 1092; fall, even years)
Advanced floral design. Management/business issues unique to floral industry.

HORT 3804. Individual Studies. (1-3 cr [max 6 cr]; fall, spring, every year)
Topics related to student's major not covered in regularly offered courses.

Hotel, Restaurant, and Tourism Management (HRT)

HRT 1111. Principles of Professional Food Production. (3 cr; fall, every year)
The mise en place, production, equipment use, vocabulary, and product development in a professional restaurant.

HRT 1112. Hospitality Safety and Sanitation. (2 cr; spring, even years)
Safety and sanitation principles for hospitality establishments and the Hazard Analysis Critical Control Points (HACCP). Can lead to Serve Safe certification from the National Restaurant Association.

HRT 1803. Directed Studies. (1-3 cr [max 6 cr]; prereq Instructor consent; fall, spring, summer, every year)
Current topics not covered in regularly offered courses.

HRT 2231. Management by Menu. (3 cr; prereq 1111; fall, odd years)
Principles of menu design, pricing, and analysis.

HRT 3241. Selection and Procurement for the Hospitality Industry. (3 cr; prereq 1111, 2231; spring, even years)
Purchasing of food, beverage, equipment, contract services, and supplies. Security measures.

HRT 3311. Restaurant Operational and Catering Management. (3 cr; prereq 1111, 2231; spring, odd years)
Theory/application of service management and advanced production techniques. Quality control methods.

HRT 3332. Global Tourism and Marketing. (3 cr; prereq MKTG 3300; fall, odd years)
Tourism as a product, its effect on local/international economy. Destination trends, marketing strategies, analysis, motivations. Development of a destination marketing plan.

HRT 3804. Individual Studies. (1-3 cr [max 6 cr]; prereq Jr, instructor consent; fall, spring, summer, every year)
Topic related to student's major not covered in regularly offered courses.

HRT 3900. Internship. (1-3 cr [max 6 cr]; prereq Instructor consent; fall, spring, summer, every year)
Supervised professional work experience at selected sites. Reports/consultation with faculty adviser/employer.

HRT 4421. Hotel, Restaurant, and Travel Law. (3 cr; prereq Sr; fall, even years)
A preventative approach. Cases applicable to the tourism industry.

HRT 4422. Hospitality Cost Control Management. (3 cr; prereq 3241, ACCT 2101; spring, even years)
Duties and responsibilities of the manager in developing, implementing, and evaluating internal controls to keep costs at realistic levels and achieve desired goals.

HRT 4431. Wine, Beverage, and Food Pairing. (3 cr; prereq Sr; spring, odd years)
Principles/practices regarding production, selection, storage, and service of beverages. Beverage sensory perception, food pairings.

HRT 4493. Destination Operational Management. (3 cr; prereq Sr; spring, odd years)
Capstone course. Procedures/principles pertaining to destination facilities; current topics, trends, design, service, guest comfort and expectations. Hospitality show/conference attendance required.

Humanities (HUM)

HUM 1301. Introduction to Humanities. (3 cr; fall, spring, every year)
The arts as a reflection of our search for understanding of the human condition. Beliefs and attitudes presented through creative expressions from around the world.

HUM 3310. Culture and Technology. (3 cr; fall, spring, every year)
Analysis of historical and cultural factors shaping technology. Synthesis of integrated relationships among technology, the arts, societal practices, and values.

Information Technology Management (ITM)

ITM 1803. Directed Studies. (1-3 cr [max 6 cr]; prereq Instructor consent; fall, spring, summer, every year)
Current topics not covered in regularly offered courses.

ITM 3020. Introduction to Management Information Systems. (3 cr; A-F or audit; prereq Acct 2101; fall, spring, summer, every year)
Theoretical background for and hands-on experience with "software as a service" applications and traditional individual/company hosted software.

ITM 3110. Microcomputer Operating Systems. (3 cr; A-F or audit; spring, every year)
Introduction to DOS, Windows 3.1, Windows 95, Windows NT, and UNIX operating systems. Single-user vs. multiuser systems, control operations, utilities, hardware, application software specifications.

ITM 3130. Messaging Systems. (3 cr; prereq 3110, 3120; fall, every year)
Unified messaging types such as electronic mail, fax, and voice. Server software such as Microsoft Exchange, Lotus Notes, and Novell Groupwise. Internet standards for messaging.

ITM 3190. Topics in Information Technology Management. (3 cr [max 9 cr]; prereq 2050, 2060; fall, spring, every year)
Topics may include cold fusion, asp, net, and other emerging platforms.

ITM 3804. Individual Studies. (1-3 cr [max 6 cr]; A-F or audit; prereq Jr, instructor consent; fall, spring, summer, every year)
Topic related to student's major, not covered in regularly offered courses.

ITM 3900. Internship. (1-3 cr [max 6 cr]; prereq Jr or instructor consent; fall, spring, summer, every year)
Supervised experience in an information or networking entity within a business firm or agency. Reports/consultations with faculty advisers and employers.

ITM 4020. Analysis and Design of Information Systems. (3 cr; prereq 2050, 2060, 3110; fall, every year)
Systems development life cycle. Needs assessment, hierarchical diagramming, entity-relationships, data-flow diagramming. Project-focused review.

ITM 4900. Senior Project in Information Technology Management. (3 cr; prereq Sr; spring, every year)
Students complete an extensive IT design/development project under guidance of faculty member and present the project to ITM faculty and senior peers.

Literature (LIT)

LIT 1005. Introduction to Literature. (3 cr; A-F or audit; fall, spring, every year)
Major forms of literature from various cultures and historical periods. Developing an informed, personal response to literature and interpretive skills required for an appreciation of literature.

LIT 1016. Readings in American Life. (3 cr; A-F or audit; fall, spring, every year)
American literature from Puritans to present. Developing an informed, personal response to that literature. Major concerns of American writers in different eras. Introduction to interpretative skills required for an appreciation of literature.

LIT 3001. World Literature. (3 cr; A-F or audit; spring, every year)
Representative works from various cultures from around the globe. Relevant historical contexts and social movements. Intensified interpretive skills for the appreciation of diverse genres.

Management (MGMT)

MGMT 1803. Directed Studies. (1-3 cr [max 6 cr]; prereq Instructor consent; fall, spring, every year)
Current topics not covered in regularly offered courses.

MGMT 3100. Managerial Finance. (3 cr; A-F or audit; prereq [ACCT 2102, ECON 2101, MATH 1031] or instructor consent; fall, spring, every year)
Principle financial considerations and ratio analysis of a business. Cost of capital, asset management, capital structure planning, financial statement analysis, working capital management, short-term financing, budgeting. Integrates theory and applications.

MGMT 3200. Principles of Management. (3 cr; A-F or audit; prereq PSY 1001 or instructor consent; fall, spring, summer, every year)
Theories, concepts, skills relevant to professional manager role. Basic functions of a manager: planning, organizing, leading, controlling. Decision making, motivation, staffing, international management, basic ethics, social responsibility, change. Integrates theory and applications.

MGMT 3210. Supervision and Leadership. (3 cr; A-F or audit; fall, spring, summer, every year)
Emphasis on organizational environment and human behavior. Human resource systems, motivating employees, leadership, managing change, job satisfaction, communication, group processes, interpersonal and group dynamics within an organization. Participative learning approach complements traditional teaching methods with role playing and case studies.

MGMT 3220. Human Resource Management. (3 cr; A-F or audit; prereq MGMT 3200; fall, every year)
Focuses on management of people at work with emphasis on recruitment, selection, training, compensation, and evaluation. Changing nature of the world of work, labor market, labor relations, emerging legal issues, discrimination in pay and employment, and effects of technological change on jobs and employment performance.

MGMT 3250. Operations Management. (3 cr; A-F or audit; prereq [MGMT 3200, MATH 1150] or instructor consent; fall, every year)
Concepts, procedures, and technologies used by managers, administrators, and employees in operation of an organization. Levels of planning, material/inventory management, improving products/systems, project management.

MGMT 3255. Logistics and Supply Chain Management. (3 cr; prereq 3250 or instructor consent; spring, every year)
Management systems for distribution, materials handling, inventory control, transportation planning, and facilities location/analysis. Logistics information systems and development of logistics strategy.

MGMT 3270. Fundamentals of E-Business. (3 cr; prereq 3200, MKTG 3300; fall, spring, every year)
Emerging trends/technologies defining rules of business in emerging information economy. Business-to-consumer, business-to-distribution channel, and business-to-supply-chain software. Skills in HTML/XML.

MGMT 3500. International Business Management. (3 cr; prereq 3200; spring, every year)
Principles, opportunities, and challenges of managing an international business. Basic managerial functions. Economic, social, and political environment.

MGMT 3600. Change, Creativity, and Innovation Management. (3 cr; prereq [3200, MKTG 3300] or instructor consent; fall, every year)
Specialized studies/cases covering management situations faced by businesses. Facilitates student research, analysis, and decisions in different business situations. Students work individually and as a management team member in making decisions.

MGMT 3804. Individual Studies. (1-3 cr [max 6 cr]; A-F or audit; prereq Jr, instructor consent; fall, spring, summer, every year)
Topic related to student's major not covered in regularly offered courses.

MGMT 3900. Internship. (1-3 cr [max 3 cr]; prereq Jr; fall, spring, summer, every year)
Students are employed as interns in a business firm, institution, or agency to gain an in-depth understanding of their field of study. Reports and consultations with faculty and employers required.

MGMT 4200. Project Management. (3 cr; =[SE 3700]; prereq 3200; spring, even years)
Procedures, team leadership skills, and resource management using computer software. Application/evaluation involving identifying a project and carrying out all steps necessary to achieve satisfactory completion in a team environment.

MGMT 4800. Strategic Management. (3 cr; A-F or audit; =[ENTR 4800]; prereq Final sem sr in [business management, management emphasis] or instructor consent; spring, every year)
Capstone, integrative course. Students chart future direction of organizations by formulating, implementing, evaluating strategies. Individual/group creative problem-solving exercises. Students make objective strategic decisions and justify them through oral/written communication.

Marketing (MKTG)

MKTG 1803. Directed Studies. (1-3 cr [max 6 cr]; prereq Instructor consent; fall, spring, every year)
Current topics not covered in regularly offered courses.

MKTG 2200. Personal Selling. (3 cr; A-F or audit; fall, every year)
Introduction to selling principles/processes. Industrial vs. ultimate consumer selling. Persuasive communication. Selling vs. buying. Time management. Emphasizes developing long-term buying/selling relationships.

MKTG 3230. Internet Marketing. (3 cr; prereq 3300; spring, every year)
Value of incorporating electronic marketing of goods/services. Strategies for using Internet to leverage marketing mix (product, price, place, promotion) for greatest possible return on investment.

Course Abbreviations
Prereqcourse prerequisites
crcredit
equivequivalent
fr, soph, jr, srfreshman, sophomore, junior, senior
=Credit will not be granted for the course if credit has been received for the course(s) listed in brackets following this symbol.
,In prerequisite listings, a comma means "and."

A prerequisite course listed by number only (e.g., prereq 3322) is in the same department as the course being described.

Courses beginning with O9 cannot be used for credit toward graduation or transfer.

Course Numbers

- 0xxx**....Courses that do not carry credit toward any University degree.
- 1xxx**.....Courses primarily for undergraduate students in their first year of study.
- 2xxx**.....Courses primarily for undergraduate students in their second year of study.
- 3xxx**.....Courses primarily for undergraduate students in their third year of study.
- 4xxx**Courses primarily for undergraduate students in their fourth year of study.
- 5xxx**.....Courses primarily for graduate students; undergraduate students in their third or fourth year may enroll in such courses.

Term Offered

A notation following course prerequisites indicates what term the course is offered (fall, spring, May session, or summer), and whether the course is offered every year, or in even or odd years.

Abbreviations in parentheses following a course name indicate the university that offers the course:

- UMTC** University of Minnesota, Twin Cities
- NDSU**..... North Dakota State University

MKTG 3250. Integrated Marketing Communication. (3 cr; A-F or audit; prereq 3200, 3300; fall, every year)

Principles of developing/managing advertising. Personal selling, public relations, sales promotion programs. Promotional strategies/mix. Marketing communications, theory, research, management. Students develop/present a promotional campaign for an actual company.

MKTG 3300. Principles of Marketing. (3 cr; A-F or audit; prereq ECON 2101 or 2102, PSY 1001 or instructor consent; fall, spring, summer, every year)

Introduction to marketing and strategic marketing process. Team development of marketing plan that implements product, pricing, distribution, and promotional strategies.

MKTG 3310. Consumer Behavior. (3 cr; A-F or audit; prereq MKTG 3300; spring, every year)

Fundamentals of consumer behavior. Behavior of individuals and groups; social and environmental factors that influence a buyer's purchase decision. Group projects outside the classroom.

MKTG 3360. International Marketing. (3 cr; A-F or audit; prereq 3300, MGMT 3200; fall, every year)

Factors affecting marketing of goods/services. Managing the organization in international environment. Students complete a team marketing plan for a product being marketed internationally.

MKTG 3400. Marketing Research. (3 cr; A-F or audit; prereq MATH 1150, MKTG 3300; fall, every year)

Research process from marketing perspective. Problem formulation, scientific research methods, analysis/interpretation of marketing data, research report writing, decision-making process derived from market research.

MKTG 3700. Brand Management. (3 cr; prereq 3250, 3300, MGMT 3200; fall, every year)

Branding, building of brand equity. Brand differentiation. Leveraging a brand in integrated marketing communications. Brand protection. Managing a brand in a competitive global environment.

MKTG 3710. Sales Management. (3 cr; prereq 2200, 3300; spring, every year)

Management of sales force to maximize revenue. Emphasizes business-to-business sales force management. Salesperson effectiveness, deployment, motivation. Organizational design, compensation, and evaluation.

MKTG 3804. Individual Studies. (1-3 cr [max 6 cr]; prereq Jr, instructor consent; fall, spring, every year)

Topic related to student's major not covered in regularly offered courses.

MKTG 4100. Retail Management. (3 cr; prereq 3300; spring, every year)

Marketing, inventory planning/control, merchandising, retail supply chain, promotions. Challenges/opportunities in competitive environment. Characteristics of successful retail managers.

MKTG 4800. Marketing Strategies. (3 cr; A-F or audit; prereq [3250, final sem sr] or instructor consent; spring, every year)

Analysis of marketing decisions, creative problem-solving exercises, presentation of case analyses and marketing plans. Individual/group projects. Students critique current marketing articles. Case studies, readings.

Mathematics (MATH)

MATH 981. Basic Math. (0 cr; prereq [3 cr equiv]; fall, spring, every year)

Operations on whole numbers, fractions, mixed numbers, decimals, order of operations, problem solving, calculator use, formulas, real numbers, exponents, scientific notation, linear equations, applications, introduction to geometry.

MATH 991. Elementary and Intermediate Algebra. (0 cr; prereq [4 cr equiv]; 0981 or equiv; fall, spring, every year)

Signed numbers, first-degree equations/inequalities, fractional equations, exponents, polynomials, factoring, rational expressions, radical expressions, graphing, systems of equations, functions.

MATH 1001. Technical Math. (3 cr; prereq MATH 0981 or equiv; Will not satisfy math/sci distribution requirements for baccalaureate degrees; no credit granted if taken after 1031 or 1150;; fall, spring, every year)

Signed numbers, calculator use, percentage problems, graphing, exponents, formulas, area/volume, solving linear equations, unit conversions, agriculture/business examples.

MATH 1031. College Algebra. (3 cr; prereq 0991 or 0992; fall, spring, every year)

Basic algebraic operations, linear/quadratic equations/inequalities, variation. Functions and their graphs. Theory of equations. Exponential/logarithmic functions. Systems of equations. Matrices, determinants.

MATH 1142. Survey of Calculus. (3 cr; prereq MATH 1031; fall, spring, every year)

Derivatives, integrals, differential equations, maxima and minima, partial differentiation, applications.

MATH 1150. Elementary Statistics. (3 cr; prereq MATH 0991, 0992 or 2 years high school algebra; fall, spring, every year)

Descriptive statistics, elementary probability, normal distribution, binomial distribution, confidence intervals, tests of hypotheses, correlation, regression, chi-square, ANOVA.

MATH 1250. Precalculus. (4 cr; prereq MATH 1031 or placement exam; fall, spring, summer, every year)

Review of algebra, functions, polynomial, rational, exponential, logarithmic, and trigonometric functions, trigonometric identities/equations, systems of equations, determinants/matrices, sequences/series, topics from analytic geometry.

MATH 1271. Calculus I. (4 cr; prereq MATH 1250 or placement exam; fall, every year)

Limits, differential calculus of functions of a single variable, applications. Introduction to integral calculus of a single variable.

MATH 1272. Calculus II. (4 cr; prereq MATH 1271; spring, every year)

Techniques of integration, calculus involving transcendental functions, polar coordinates, Taylor polynomials, vectors/curves in space, cylindrical/spherical coordinates.

Music (MUS)

MUS 1011. University Singers. (1 cr [max 6 cr]; fall, spring, every year)

Performing group provides experience in many areas of choral music.

MUS 1021. Introduction to Music. (3 cr; fall, every year)

Music from Renaissance to present. Styles, forms, expressions. Some examples of music from various cultures compared with western art music.

MUS 1041. Private Music Instruction. (1 cr [max 6 cr]; fall, spring, every year)

Individual music lessons in voice or instruments. One half-hour lesson per week.

MUS 1042. Private Instruction: Class Piano. (1 cr [max 6 cr]; fall, spring, every year)

Study of piano technique/musicianship in classroom setting using multiple electronic keyboards. Musical concepts, including melody, harmony, rhythm, repertoire.

MUS 1051. Pep-Jazz Band. (1 cr [max 6 cr]; fall, spring, every year)

Ensemble of musicians play brass, woodwind, percussion instruments at concerts on/off campus and at selected UMC athletic events.

MUS 1071. Musical Theater. (1 cr [max 6 cr]; spring, every year)

Involvement in a musical theatre presentation. May include musical accompaniment, acting, singing, technical support.

MUS 1111. Music Theory I: Foundations of Tonal Music. (3 cr; fall, offered when feasible)

Theory and notation, two-part counterpoint; consonance and dissonance; melodic contours; music fundamentals (key signatures, scales, rhythms, chordal construction). Writing and analyzing basic diatonic tonal structures.

MUS 1121. Music Theory II: Diatonic Tonality, Harmony and Voice Leading. (3 cr; prereq Mus 1111; spring, offered when feasible)

Basic harmonic and contrapuntal relationships. Sonata, rondo, variation, minuet, and other standard categories of tonal composition. Chromatic tonal practices; expanded choral vocabulary, voice leading analysis. Basic theories of 20th-century music.

MUS 3011. University Singers (Choir). (1 cr [max 6 cr]; prereq 1011, audition demonstrating skill in [sight-reading, accuracy of pitch, basic musicianship]; fall, spring, every year)

Performing group that provides experience in many areas of choral music. Students serve as section leaders, are required to review music to be rehearsed by ensemble before the music is "handed out."

MUS 3029. Music of the Twentieth Century. (3 cr; prereq Mus 1021 or instructor consent; spring, odd years)

Compares various styles of 20th-century music to develop an understanding of human expression; compares musical forms and trends.

MUS 3041. Private Instruction. (1 cr [max 6 cr]; prereq Instructor consent; fall, spring, every year)

Advanced music instruction.

MUS 3051. Pep-Jazz Band. (1 cr [max 6 cr]; prereq audition; fall, spring, every year)

Students serve as section leaders, are required to review music to be rehearsed by ensemble before the music is "handed out."

MUS 3091. Instrumental and Choral Conducting. (2 cr; prereq At least 2 cr of Mus 1011 and/or 1051, instructor consent; spring, every year)

Conduct UMC ensembles to develop score reading skills, conducting techniques.

Natural Resources (NATR)

NATR 1226. Environmental Science and Sustainability. (3 cr; fall, every year)

Interdisciplinary survey course. Applying ecological principles to social systems, food/fiber production. Economic considerations of land use and rural communities, pollution, global warming, energy production/use, and biodiversity.

NATR 1233. Introduction to Natural Resources. (3 cr; A-F or audit; fall, every year)

Survey of our natural resource heritage with emphasis on North America. Various fields within natural resources examined in terms of conservation practices, employment opportunities, and importance to sustainable societies.

NATR 1244. Elements of Forestry. (4 cr; A-F or audit; prereq 1233; spring, every year)

Forest management: ecology, silviculture, protection, and multiple-use decision-making processes. Woody forest plants: identification, growth requirements, and management techniques. Compass use and map reading. Survey of the lake states forest products industry.

NATR 1663. Principles of Fisheries Management. (3 cr; A-F or audit; prereq 1233; spring, every year)

Fisheries management and fish species of Minnesota. Identification, ecology, population assessment, application of appropriate management techniques.

NATR 1803. Directed Studies. (1-3 cr [max 6 cr]; prereq Instructor consent; fall, spring, every year)

Current topics not covered in regularly offered courses.

NATR 2573. Entomology. (3 cr; A-F or audit; =[AGRO 2573]; prereq HORT 1010 or AGRO 1183; fall, every year)

Insect taxonomy, anatomy, and physiology. Emphasis on insects of economic importance, especially in the Upper Midwest. Control methods, including integrated pest management.

NATR 2630. Introduction to Geographic Information Systems. (3 cr; A-F or audit; prereq 1244, MATH 1031; fall, spring, every year)

Application/use of computer-based information systems, data delivery, and geographic information systems in natural resource management and regional planning. Labs focus on developing basic competence using current suite of ArcGIS software and finding, retrieving and utilizing data currently available from public resource management agencies.

NATR 2899. Pre-Internship Seminar. (.5 cr; fall, every year)

Expectations/responsibilities of internship. Preparing for a job search. Presentations about internship experiences by those who have recently completed internship. Discussion between students, staff and invited guests.

NATR 3203. Park and Recreation Management. (3 cr; A-F or audit; prereq NATR 1233; spring, every year)

Survey of park and recreational area management. The recreationist; federal and state legislation; the roles of federal, state, local, and private sector recreation managers; and management techniques as they affect the private and public recreational area manager.

NATR 3296. Special Topics in Wildlife Management. (1-3 cr [max 6 cr]; prereq Sr or instructor consent; fall, spring, summer, offered when feasible)

Offered on demand. Focused studies on wildlife-related topics. Seminars by students and guest speakers, field trips, global studies trips abroad.

NATR 3297. Spec Topics in Water Resources. (1-3 cr [max 6 cr]; prereq Sr or instructor consent; fall, spring, every year)

Focused studies on water-related topics offered on demand. Seminars by students and guest speakers, field trips, global studies trips abroad.

NATR 3344. Land Use Planning. (3 cr; prereq Jr or Sr status; spring, every year)

Ecological, economic, and legal principles applied to land use planning in relation to agricultural, industrial, residential, wild land, forestry, recreational, and transportation needs. Legislative, agency, and citizen involvement in environmental law formulation and enforcement. Case studies.

NATR 3364. Plant Taxonomy. (3 cr; A-F or audit; prereq BIOL 2022 or instructor consent; spring, every year)

Principles of plant taxonomy with emphasis on higher vascular plants of the Upper Midwest: family characteristics, floral structure, ecology, evolutionary relationships, values to human life, and importance as wildlife food and cover. Methods of field study and collection.

NATR 3368. Land Management Field School. (1-4 cr [max 4 cr]; prereq Junior or Senior status; summer, every year)

Intensive field-oriented program of study. Application of land management techniques in field situations. Guest lectures, field trips to natural resource agency projects.

NATR 3374. Ecology. (4 cr; A-F or audit; prereq BIOL 1009, SOIL 1293; fall, every year)

Interactions among plants, animals, and the physical environment; structure and function of ecosystems; population dynamics, biotic communities; principles of biotic succession and ecosystem management.

NATR 3376. Wetland and Riparian Ecology and Management. (3 cr; prereq 3374; fall, every year)

Ecology/management of wetland/riparian lands from global, continental, and Minnesota perspective. General ecology, structure/function, delineation, wetland plant identification, restoration/regulation programs.

NATR 3464. Mammalogy. (3 cr; =[BIOL 3464]; prereq BIOL 2012; fall, every year)

Classification, reproduction, physiology, behavior, ecological adaptations, zoogeography of mammals. Emphasizes techniques used in field/laboratory studies.

NATR 3466. Ornithology. (3 cr; =[BIOL 3466]; spring, every year)

Classification, reproduction, physiology, behavior, ecological adaptations, zoogeography of birds. Emphasizes techniques used in field/laboratory studies.

NATR 3468. Wildlife Habitat Management Techniques. (3 cr; fall, every year)

Planning, ecological effects, application, monitoring of habitat management as used by conservation organizations: site preparation, planting, mowing, burning, grazing, herbicide use. Certification in prescribed burning, pesticide use. Wetland restoration, surface-mined land reclamation.

Course Abbreviations

Prereqcourse prerequisites
crcredit
equivequivalent
fr, soph, jr, sr freshman, sophomore, junior, senior
= Credit will not be granted for the course if credit has been received for the course(s) listed in brackets following this symbol.
, In prerequisite listings, a comma means "and."

A prerequisite course listed by number only (e.g., prereq 3322) is in the same department as the course being described.

Courses beginning with O9 cannot be used for credit toward graduation or transfer.

Course Numbers

- Oxxx**....Courses that do not carry credit toward any University degree.
- 1xxx**.....Courses primarily for undergraduate students in their first year of study.
- 2xxx**.....Courses primarily for undergraduate students in their second year of study.
- 3xxx**.....Courses primarily for undergraduate students in their third year of study.
- 4xxx**Courses primarily for undergraduate students in their fourth year of study.
- 5xxx**.....Courses primarily for graduate students; undergraduate students in their third or fourth year may enroll in such courses.

Term Offered

A notation following course prerequisites indicates what term the course is offered (fall, spring, May session, or summer), and whether the course is offered every year, or in even or odd years.

Abbreviations in parentheses following a course name indicate the university that offers the course:

- UMTC**University of Minnesota, Twin Cities
- NDSU**.....North Dakota State University

NATR 3495. Special Topics in Wilderness Management. (1-3 cr [max 12 cr]; A-F or audit; prereq NATR 3203; spring, every year)

Directed study offered once a year, with the following topics covered on a rotating basis: wilderness philosophy and ethic development, management of the wilderness resource, management of recreation resources, and wilderness management planning. Involves significant use of new communications technologies.

NATR 3496. Special Topics in Ecology and Conservation Biology. (1-3 cr [max 9 cr]; prereq 3374; fall, spring, every year)
Topics ecology and conservation biology. Recent/significant primary literature. Critical thinking/evaluation. Application to issues in ecological research.

NATR 3520. Natural Resource Law Enforcement Techniques. (3 cr; =[CRJS 3520]; prereq 1233, CRJS 1120; spring, even years)
Survey of methods, procedures, and techniques in natural resource field law enforcement work. Natural resource case law. Applicable statutes pertaining to tenets of search/seizure, arrest, surveillance, and court system.

NATR 3635. Geographic Information Systems Applications. (3 cr; A-F or audit; prereq 2630; fall, every year)
Advanced principles/applications of geographic information systems. Nature/accuracy of geo-referenced data and methods of data capture, storage, retrieval, modeling, and digital map display. Includes semester-long lab project.

NATR 3654. Wildlife Ecology and Management. (4 cr; A-F or audit; prereq NATR 3374; fall, every year)
Application of ecological principles to studying and managing wildlife populations, with emphasis on habitat management. Management plan preparation. Field and lab techniques used by natural resource agencies.

NATR 3660. Prairie Ecosystem Management. (2 cr; A-F or audit; prereq NATR 3374; spring, every year)
Description of prairie biome of North America, ecological relationships. Uses by native American, European peoples as setting for art/literature and as habitat for wildlife/livestock, management, restoration. Identification of prairie plants.

NATR 3699. Integrated Resource Management. (3 cr; A-F or audit; prereq Sr or instructor consent; spring, every year)
Team study exploring synthesis of environmental, technical, economic, political, and administrative principles as applied to case studies and current management situations. Emphasis on decision-making process.

NATR 3804. Individual Studies. (1-3 cr [max 6 cr]; prereq Jr, instructor consent; fall, spring, every year)
Topic related to student's major not covered in regularly offered courses.

NATR 3899. Pre-Internship Seminar. (.5 cr; fall, every year)
Expectations/responsibilities of internship. Preparing for a job search. Presentations about internship experiences by those who have recently completed internship. Discussion between students, staff, and invited guests.

NATR 3900. Internship. (.5-4 cr [max 4 cr]; prereq 3899; fall, spring, summer, every year)
Supervised professional work experience in natural resource agencies, private companies, and businesses. Report/consultation with faculty adviser/employer.

NATR 3901. Post-Internship Seminar. (.5 cr; prereq 3900; fall, every year)
Students who have recently completed internships, prepare/deliver a PowerPoint presentation of experience/knowledge gained. Discussions between post/pre-internship students, staff, and invited guests.

NATR 4652. Seminar. (1 cr; A-F only; prereq Jr or sr; fall, spring, every year)
Survey of current literature in horticulture, aviation, golf and turf, and natural resources. Preparation/delivery of special topics. Preparation of abstracts. Evaluation of seminars. Use of library and other resources, including computer information searches.

Networking and Telecommunications (NT)

NT 3120. Networking Standards and Protocols. (3 cr; A-F or audit; prereq ITM 3110; fall, spring, every year)
Design, implementation, and management of an enterprise network. Servers, routers, bridges, gateways, transmission media, communications protocols, network security, performance tuning.

NT 3215. Information Assurance and Systems Security. (3 cr; prereq 3120, ITM 3110; fall, spring, every year)
Hacking culture. Impact of computer crime and Internet fraud. How a network/systems administrator can design/implement countermeasures to defend/protect systems assets.

Occupational Therapy (OT)

OT 1003. Orientation to Occupational Therapy (UMTC). (1 cr; S-N or audit; fall, spring, every year)
Survey of profession. Lectures, films, demonstrations, tours.

Philosophy (PHIL)

PHIL 1001. Introduction to Philosophy. (3 cr; A-F or audit; fall, spring, summer, every year)
Critical introduction to three fundamental questions of philosophy: What can I know? What can I believe? What ought I to do? Emphasis on developing ability to think, speak, and write critically.

PHIL 2002. Introduction to Ethics. (3 cr; fall, spring, every year)
Foundational concepts of ethics. Applications in various contexts.

PHIL 3003. Applied Ethics. (3 cr; A-F or audit; prereq 1001; fall, spring, summer, every year)
Interdisciplinary examination of four areas of contemporary ethical concern: research ethics, agricultural ethics, business ethics, and biomedical ethics.

Physical Education and Recreation (PER)

PER 1151. Golf. (1 cr; fall, offered when feasible)
Introduction to and practice of the fundamentals of golf.

PER 1201. Dance (Folk, Social, Modern, Western). (1 cr; fall, every year)
An alternative for aerobic activity. Acquaints students with dance and dance variety. Recreational dance course.

PER 1341. Court Activities. (1 cr; fall, every year)
Introduce fundamental skills, rules/strategies of volleyball, racquetball, tennis, and badminton. Progressing toward optimum ability. Achieving lifetime fitness.

PER 1451. Fitness for Better Health. (1 cr [max 2 cr]; fall, spring, offered when feasible)
Individualized approach to designing and following through with a personalized fitness program. Exercise programs and activities in the fitness area. A form of wellness program, with emphasis on fitness.

PER 1461. Physical Training and Conditioning. (1 cr; fall, spring, every year)
Promotion and development of lifetime fitness through weight training and conditioning.

PER 1471. Olympic Weight Training. (1 cr; prereq PER 1461; spring, every year)
Techniques for advanced strengthening/conditioning.

PER 1481. Aerobic Exercise. (1 cr [max 4 cr]; fall, spring, offered when feasible)
Promotes overall fitness. Incorporates aerobic movement for cardiovascular workout plus light weight training for strength and endurance. Stretching, flexibility, and relaxation.

PER 1601. Aquatic Activities (Beg Swim, Adv Beg, Intermediate, Swimmer, Lifeguard Trng/WSI, Aqua Aerobics). (1 cr [max 4 cr]; spring, every year)
Strokes, personal safety, and basic rescue skills in accordance with guidelines established by the American Red Cross.

PER 1701. Varsity Sports: Football. (1 cr; fall, every year)
To study, practice, and participate in all individual and team skills of football.

PER 1711. Varsity Sports: Volleyball. (1 cr; fall, every year)
Varsity collegiate volleyball experience.

PER 1712. Varsity Sports: Tennis (W). (1 cr; spring, every year)
For students who wish to participate at the intercollegiate level.

PER 1714. Varsity Sports: Golf (W). (1 cr; fall, every year)
Daily practice sessions, game competition. Evaluation based on satisfactory participation, completion of golf season.

PER 1716. Varsity Sports: Golf (M). (1 cr; fall, every year)
Daily practice sessions, game competition. Evaluation based on satisfactory participation, completion of golf season.

PER 1722. Varsity Sports: Soccer (W). (1 cr; A-F or audit; fall, every year)
Rules and basic strategies of soccer. Basic techniques of the major components of soccer. Appreciating and practicing the game of soccer.

PER 1731. Varsity Sports: Basketball (W). (1 cr; A-F or audit; spring, every year)
Varsity collegiate basketball experience.

PER 1741. Varsity Sports: Basketball (M). (1 cr; A-F or audit; spring, every year)
Varsity collegiate basketball experience.

PER 1761. Varsity Sports: Equestrian. (1 cr; spring, every year)
Students participate/compete in equestrian events at collegiate level.

PER 1781. Varsity Sports: Softball (W). (1 cr; spring, every year)
For athletes who wish to compete at the intercollegiate level.

PER 1791. Varsity Sports: Baseball (M). (1 cr; spring, every year)
To practice, study, and participate in all individual and team skills of baseball.

Physics (PHYS)

PHYS 1001. Elementary Physics. (3 cr; A-F or audit; prereq MATH 1031; fall, spring, summer, every year)
Fundamental laws of mechanics, fluids, temperature, gas laws, electricity, wave motion, origins of modern physics, radioactivity.

PHYS 1003. Introduction to Astronomy. (3 cr; fall, spring, summer, every year)
Human's place in Universe. Earth, other planets, sun, stars, galaxies. Background/fragility of life on Earth. Scale, origin, history of Universe.

PHYS 1012. Introductory Physics. (4 cr; prereq MATH 1031; fall, spring, summer, every year)
Motion, forces, torque, energy, heat, sound, light, electricity, magnetism. Emphasizes applications.

PHYS 1101. Introductory College Physics I. (4 cr; prereq MATH 1031; fall, every year)
First of two-semester sequence. Algebra-based introduction to physics and physics problem solving. Motion, forces, torque, momentum, energy, thermal energy/heat. Topics presented in applied context.

PHYS 1102. Introductory College Physics II. (4 cr; prereq MATH 1031, PHYS 1101; spring, every year)
Second of two-semester sequence. Algebra-based introduction to physics and physics problem solving. Vibrations, light, sound, electricity, magnetism. Selected modern physics topics (e.g., radiation). Topics presented in applied context.

Political Science (POL)

POL 1001. American Government. (4 cr; fall, spring, every year)
Introduction to politics/government in the United States. Constitutional origins/development, major institutions, parties, interest groups, elections, participation, public opinion. Ways of explaining politics. Nature of political science.

POL 1054. Comparative Government. (3 cr; fall, spring, offered when feasible)
Government systems of the United States, Soviet Union, Great Britain, Japan, and France. Third World and Middle Eastern countries' political and social impacts studied through current events.

Psychology (PSY)

PSY 1001. General Psychology. (3 cr; fall, spring, summer, every year)
Overview of psychology as scientific study of human/animal behavior. Emphasizes goals of psychology: to describe, understand, predict, and control behavior. Biological, cognitive, affective, and social perspectives.

PSY 1093. Lifespan Development. (3 cr; fall, spring, summer, every year)
Human life span perspective. Integrates developmental principles through research of social issues. Theories of major developmental theorists, recent challenges from changes in society/family interrelationships. Total environmental issues. Progress in genetics/medicines toward a better understanding of human development.

PSY 2253. Human Behavior and Diversity Issues. (3 cr; prereq 1001; spring, every year)
Understanding diversity from psychological, political, economic, and industrial perspectives. Dynamics of race, ethnicity, culture, and gender in American society.

PSY 3201. Social Psychology. (3 cr; spring, every year)
How thoughts, feelings, and behavior of individuals are affected by others. Social influence/interaction. Attitude measurement/change. Conformity, impression formation, attribution theory, aggression, prosocial behavior.

PSY 3520. Industrial and Organization Psychology. (4 cr; prereq 1001, 3707; spring, every year)
Psychology of business enterprise. Leadership, labor relations, motivation, selection, performance, stress, group dynamics, organizational structure/change. Experiential learning, student centered discussion.

PSY 3604. Abnormal Psychology. (3 cr; prereq PSY 1001; fall, spring, every year)
Comprehensive study of abnormal behavior. Focuses on causal factors, treatment, and outcome of maladaptive behavior. Systematic study of biological, behavioral, and psychosocial therapies as modes of treatment and prevention of disorders. Lectures, case studies, videos, group discussions, oral presentations, term paper.

PSY 3707. Organizational Psychology. (3 cr; prereq 1001; fall, every year)
Leadership, job satisfaction, motivation theories, goal setting, organizational behavior, organizational development, industrial relations.

PSY 3804. Individual Studies. (1-3 cr [max 6 cr]; prereq Jr, instructor consent; fall, spring, summer, every year)
Topic related to student's major not covered in regularly offered courses.

PSY 3900. Internship. (1-6 cr [max 6 cr]; prereq Jr, instructor consent; fall, spring, summer, every year)
Students are employed as interns in a business firm, institution, or agency to gain an in-depth understanding of their field of study. Reports, consultations with faculty/employers.

PSY 4203. Organization and Transitional Change Seminar. (3 cr; prereq [1001, 3707] or instructor consent; fall, every year)
Historical, contemporary, and emerging changes in cultures/societies on international/U.S. domestic organizations. Stages of change, strategies. Tools to assist individuals/organizations through systems processes leading to positive outcomes.

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- 4xxx**....Courses primarily for undergraduate students in their fourth year of study.
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Term Offered

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Abbreviations in parentheses following a course name indicate the university that offers the course:

- UMTC**....University of Minnesota, Twin Cities
- NDSU**.....North Dakota State University

Public Health (PUBH)

PUBH 1003. Alcohol and College Life (UMTC). (1 cr; prereq Fr or soph or pseo; fall, spring, every year)
Facts about how alcohol affect college life. Personal prevention strategies. Maximizing student/campus safety. Web-based distance learning format.

PUBH 3005. Fundamentals of Alcohol and Drug Abuse (UMTC). (1 cr; prereq Jr or sr; spring, every year)
Scientific, sociocultural, and attitudinal aspects of alcohol and other drug abuse problems. Emphasizes incidence, high risk populations, prevention, intervention. Lecture, discussion, special readings.

Scientific and Technical Communication (STC)

STC 3701. Rhetoric Theory: Persuasion and the Literature of Science. (3 cr; prereq Comp 1011 or 1013, Spch 1101; fall, spring, offered when feasible)
Principles/history of rhetorical theory/criticism. Classical theories, especially Aristotle's Rhetoric. Aristotelian concepts applied to examples of contemporary communication. Relation of classical theory to scientific discourse/technical communication.

Sociology (SOC)

SOC 1001. Introduction to Sociology. (3 cr; fall, spring, summer, every year)
Culture, social institutions, socialization, groups, social class, race and ethnicity, collective behavior, and social deviance.

SOC 1102. Cultural Anthropology. (3 cr; fall, offered when feasible)
Human culture from advent of agriculture to present. Methods used in cultural anthropology; linguistics; general theories of culture; functions of religion, law, kinship, systems, and other major influences in selected cultures.

SOC 3001. Social and Behavioral Science Research Methods. (3 cr; fall, every year)
Fundamental concepts/methods involved in conducting social/behavioral science research. Design a research project, collect relevant data, conduct data analysis and report/present research findings.

SOC 3937. Social Gerontology: Elders in American Society. (3 cr; fall, spring, summer, every year)
Survey of characteristics/concerns of older persons. Physical, social, psychological, and cultural factors associated with aging. Individual outside work with older person.

Software Engineering (SE)

SE 1500. Discrete Structures I. (3 cr; fall, every year)
Foundations of discrete mathematics as they apply to software engineering. Functions, relations, sets, simple proof techniques, boolean algebra, propositional logic, digital logic, elementary number theory, fundamentals of counting.

SE 1600. Discrete Structures II. (3 cr; prereq 1500; spring, every year)
Predicate logic, recurrence relations, graphs, trees, matrices, computational complexity, elementary compatibility, discrete probability.

SE 2050. Introduction to Programming I. (3 cr; prereq MATH 1031 or 2 yrs high school algebra or ACT score of 20; fall, every year)
Structured/object oriented programming with current industry accepted languages. Data, selection, and iteration structures. Input/output operations, class definitions, interfaces, exception handling, inheritance, composition, polymorphism.

SE 2070. Introduction to Programming II. (3 cr; prereq 2050; spring, every year)
Java programming language and development process. Objects, classes, packages, applets.

SE 2090. Data Structures and Algorithms. (3 cr; fall, every year)
Recursion, underlying philosophy of object-oriented programming. Fundamental data structures (including stacks, queues, linked lists, hash tables, trees, graphs). Algorithmic analysis. Principles of language translation.

SE 2100. Microcomputer Systems Architecture. (3 cr; fall, every year)
Computer organization/machine architecture. Overview of computer system organization. Digital logic level, register level, operating system program interface. May use assembly language of an available machine for programming assignments.

SE 2200. Introduction to Software Engineering. (3 cr; prereq 2050, 2060; spring, every year)
Software development methodologies. Emphasizes object-oriented methodologies. Risk analysis, testing techniques/strategies, project management, architectural/user interface design, technical metrics for software.

SE 2300. Software Construction. (3 cr; prereq 2200; fall, every year)
Low-level software design issues, including formal approaches.

SE 2400. Software Engineering Approach to Human Computer Interaction. (3 cr; fall, every year)
Topics relating to designing/evaluating user interfaces. Psychological background needed to understand people.

SE 3050. Database Management Systems. (3 cr; A-F or audit; prereq 2050; fall, spring, summer, every year)
Database design management/implementation. Data modeling, normalization, relational algebra, SQL, Procedural SQL, physical database design, distributed databases. Use of common DBMSs and modeling tools.

SE 3060. Data Warehousing and Mining. (3 cr; prereq 2060, MATH 1150; spring, every year)
How data warehousing and mining fits in decision support systems. Data warehouse planning, design, and implementation on enterprise DBMS. Data mining techniques and algorithms. Application of data mining software.

SE 3145. XML. (3 cr; prereq 2060, 2070; fall, spring, every year)
Students create well-formed XML documents, enforce rules through document type definitions/schemas, and manipulate XML documents through document object model and simple API for XML. Complementary technologies, including XSL, CSLT, XPath, XLink, HTML, and CSS.

SE 3200. Software Design and Architecture. (3 cr; prereq 2200; fall, every year)
Formal methods of software analysis/design. Requirement analysis, definition. Specification, including formal methods, prototyping. Design, including object/function oriented design.

SE 3300. Software Quality Assurance and Testing. (3 cr; prereq 2200; spring, every year)
Software quality assurance. Reviews/inspections, testing, formal verification methods, process management/improvement, defect prevention.

SE 3400. Software Requirements Analysis. (3 cr; prereq 2200; spring, every year)
Discovering/eliciting requirements, languages and models for representing requirements, analysis/validation techniques, specifying/measuring external qualities, requirements in agile processes, requirements change management.

SE 3700. Software Project Management. (3 cr; = [MGMT 4200]; prereq 2200, MGMT 3200; fall, spring, offered when feasible)
Procedures, team leadership skills, and resource management using computer software. Application/evaluation involving identifying a project and carrying out all steps necessary to achieve satisfactory completion in a team environment.

SE 3820. Gaming: Real-Time Systems. (3 cr; prereq 3050, MATH 1272, PHYS 1102; spring, every year)
Mathematical foundations/modeling techniques, mapping, anti-aliasing, real-time rendering, binary space partition trees, object control issues.

SE 3900. Internship. (3 cr [max 6 cr]; fall, spring, summer, every year)
Students identify employment opportunities in the field.

SE 4500. Senior Project I. (3 cr; prereq 3500; fall, every year)
First of a full year, individual project/research course. Students pursue projects or research (applied in nature), with a faculty adviser, within their area of specialization.

SE 4510. Senior Project II. (3 cr; prereq 4500; spring, every year)
Second of a full year, individual project/research course. Students pursue projects or research (applied in nature), with a faculty adviser, within their area of specialization.

Soil and Water Management (SWM)

SWM 3009. Hydrology and Water Quality. (4 cr; prereq CHEM 1001, MATH 1031, SOIL 1293, jr, or instructor consent; spring, every year)
Principles/theory of surface/ground water quality, including but not limited to water budget, hydrologic cycle, water quantities, Darcy's Law, water quality units and flow rates, hydraulic conductivity/permeability, and laboratory tests for and maintenance of water quality.

SWM 3103. Meteorology and Climatology. (3 cr; A-F or audit; prereq PHYS 1012; spring, every year)
Fundamentals of weather/climate. Energy balance, weather chart analysis, composition/circulation patterns of atmosphere, climates of continents.

SWM 3224. Soil and Water Conservation. (4 cr; prereq SOIL 1293, jr, or instructor consent; fall, every year)
Management principles and practices used to increase productivity and conserve soil and water resources for agronomic crops. Maintaining wildland and environmental quality through use of shelterbelts.

SWM 3225. Watershed Management. (3 cr; fall, every year)
Precipitation, infiltration, evapo-transpiration, runoff from small watersheds. Application to design of structures, water/wind erosion practices. Design principles/techniques in constructing small impoundments and waste holding facilities, and in restoring wetlands. Selecting/applying irrigation/drainage systems.

Soil Science (SOIL)

SOIL 1293. Soil Science. (3 cr; prereq CHEM 1001; fall, spring, every year)
Formation, classification, and composition of soils, with emphasis on environmental quality, chemical and physical properties affecting growth and nutrition of plants, management principles and practices used to increase productivity and conserve soil and water resources for agronomic crops.

SOIL 3414. Soil Fertility and Plant Nutrition. (4 cr; prereq SOIL 1293, soph, or instructor consent; fall, spring, every year)
Soil fertility management and its effect on crop growth. Uptake and use of specific important nutrients; use of fertilizers, their composition and characteristics; importance of residue management to maintain high productivity; environmental impact of certain agronomic practices.

Spanish (SPAN)

SPAN 1104. Beginning Spanish I. (4 cr; fall, spring, every year)
Conversational Spanish centered on day-to-day experiences. Emphasis on verb conjugation, rules of grammar, and vocabulary building. Cultural awareness and appreciation.

SPAN 1204. Beginning Spanish II. (4 cr; prereq SPAN 1104 or 2 years high school Spanish; fall, spring, every year)
Emphasis on verb conjugation with the addition of compound tenses, indicative and subjective moods. Vocabulary building; dialogue concerning sports, travel, service information. Cultural and political dimensions of Spanish-speaking countries.

Speech (SPCH)

SPCH 1101. Public Speaking. (3 cr; A-F or audit; fall, spring, summer, every year)
Topic selection, research, organization, rehearsal, and extemporaneous delivery of informative and persuasive speeches.

Sport and Recreation Management (SRM)

SRM 1803. Directed Studies. (1-3 cr [max 6 cr]; prereq Instructor consent; fall, spring, summer, every year)
Current topics not covered in regularly offered courses.

SRM 2000. Prevention and Care of Athletic Injuries. (3 cr; A-F or audit; prereq BIOL 2103; spring, every year)
Instruction/practice in fundamental athletic training skills. Historical perspective of athletic training as a career. Basic terminology of injuries. Prevention, taping, immediate care.

SRM 2010. Topics in Coaching. (1-3 cr [max 6 cr]; fall, spring, every year)
Philosophies, theories, methods, and techniques of coaching different sports.

SRM 2100. Psychology of Sport. (3 cr; spring, every year)
Sport in terms of motivation/performance. Sport and human development.

SRM 2200. Socio-Cultural Dimensions in Sport. (3 cr; fall, every year)
General relationship between sport and society. Ways sport is linked to other spheres of social life. Organization and behavior patterns that exist within sport settings. Cultural, structural, and situational factors and social processes related to sport.

SRM 3000. Foundations of Sport and Recreation Management. (3 cr; spring, every year)
Scope/extent of sport/recreation management. Accounting, career opportunities, composition, computer applications, facility/equipment management, fund-raising, grant writing, health/wellness, human communication, law, multilevel scheduling, management principles, marketing, promotions.

SRM 3001. Sports Nutrition. (3 cr; prereq BIOL 1009 or CHEM 1001 or HSCI 1123; spring, every year)
Nutrition principles applied to fitness and sport. The six nutrients, body composition, training and conditioning, weight maintenance, nutrition in competitive sports.

SRM 3002. Legal Aspects of Sport. (3 cr; prereq GBUS 3107; fall, every year)
Legal principles affecting managers, sponsors, and users of sport and recreation programs, including the vocabulary of contract negotiation and civil rights in planning, developing, maintaining, and managing sport and recreation organizations.

SRM 3003. Facility and Equipment Management. (3 cr; spring, every year)
Design, layout, and maintenance strategies for managing sports facilities. Purchasing, organizing, and maintenance strategies for managing equipment used for multiple sport and recreation activities.

SRM 3005. Communication in Sport. (3 cr; prereq CA 1070, Comp 3008 or Comp 3303, MATH 1150; fall, every year)
Media relations, public relations, data gathering/analysis, presenting information to public/media.

SRM 3006. Sports Marketing. (3 cr; prereq MKTG 3300; fall, every year)
Applying theories/principles of marketing to sport industry. How marketing is used in various SRM settings, from local sporting and amateur events to professional leagues.

SRM 3020. Coaching Practicum. (1 cr; prereq 2010; fall, spring, summer, every year)
Students apply coaching technique in clinical setting.

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SRM 3320. Exercise Physiology. (3 cr; prereq BIOL 2103; fall, every year)

Responses/adaptations of body's physiological systems to physical activity, biochemical foundations of these changes. Sport nutrition. Exercise and immune function. Body composition analysis, muscle metabolism, exercise bioenergetics.

SRM 3804. Individual Studies. (1-3 cr [max 6 cr]; prereq Jr, instructor consent; fall, spring, summer, every year)

Topic related to student's major not covered in regularly offered courses.

SRM 3900. Internship in Sport and Recreation Management. (1-3 cr [max 3 cr]; prereq Jr, instructor consent; fall, spring, summer, every year)

Field-based learning experience.

SRM 4099. Seminar in Sport and Recreation Management. (1 cr; prereq Sr, instructor consent; spring, every year)

Capstone course emphasizing design, implementation, and evaluation of an entire sport or recreation program in terms of a virtual portfolio.

Theatre (TH)

TH 1121. Theatre Production. (1 cr [max 6 cr]; fall, spring, every year)

Involvement in one or more of the following: acting, directing, costuming, set construction, makeup, publicity, coaching, lighting, sound.

TH 1131. Acting I. (3 cr; spring, odd years)

Introduction to acting for theater. Physical/vocal training. Creativity/emotional recall exercises. Performance. Basic techniques of acting.

Turf (TURF)

TURF 1072. Principles of Turf Management. (3 cr; spring, every year)

Species identification. Cultural requirements/principles for establishing, producing, and maintaining turf. Golf course turf care/maintenance.

TURF 1803. Directed Studies. (1-3 cr [max 6 cr]; fall, spring, summer, every year)

Topics not offered in regularly scheduled courses.

TURF 3074. Turfgrass Pest Management. (3 cr; prereq 3072 or instructor approval; spring, every year)

Identification/control of turfgrass diseases, weeds, and insects. Emphasizes integrated cultural/chemical management methods.

TURF 3076. Turfgrass Management Systems. (3 cr; prereq 3074; fall, every year)

Advanced skills for establishment, maintenance, and renovation. Strategies for developing turfgrass management systems. Decision-making and problem-solving in applied-business context. Professional skills development.

TURF 3077. Turf and Landscape Irrigation Design and Installation. (2 cr; A-F or audit; fall, every year)

Basic irrigation design, including pipe sizing/selection, pressure loss, sprinkler types/selection. Installation equipment, techniques. Lab.

TURF 3804. Individual Studies. (1-3 cr [max 6 cr]; fall, spring, summer, every year)

Topics not included in regularly scheduled courses.