Technology, Art and Design -Technology Courses

TADT 1111 Introduction to Project Management (3 credits)
Introduction to the principles and practices associated with project management in a professional environment, to include the utilization of project management methodology in support of planning the participants academic career as a student at Bemidji State University. In further support of the participants academic career, the course will also emphasize professional communications in various written and electronic formats.

TADT 1210 Introduction to Manufacturing Processes I (3 credits)
An introduction to manufacturing processes including; welding, metal forming, centrifugal casting, injection/blow molding, silicone molding/resin casting, and vacuum forming. This course will utilize various types of metals, plastic, and resin materials to construct projects.

TADT 1220 Introduction to Manufacturing Processes II (3 credits)
A comprehensive study of the separating processes which occur in manufacturing production. Traditional and non-traditional processes are introduced, along with the primary materials which are utilized in the separation processes.

TADT 1227 Fabricating Fundamentals (3 credits)
Overview of fundamental lab processes related to extremely diversified industry that produces products in a production environment. Traditional and Non-Traditional processes are introduced along with theories, rules and practices associated with fabrication.

TADT 1315 Energy and Power Technology (3 credits)
Survey of types and sources of energy. Addresses the transmission and application of energy and power systems in a variety of construction and industrial applications, including mechanical, fluid, and renewable technologies such as solar, wind and geothermal.

TADT 1350 Electrical/Electronic Technology (3 credits)
Fundamental principles of electricity and electronics. Various topics are explored including basic circuits, transformers and motors.

TADT 1450 Introduction to Product Development (3 credits)
This course is an introduction to three-dimensional communication techniques for the model making profession. Utilizing hand tools, project construction will include an awareness of attention to detail, design and technical problem solving. Prerequisite: TADT 1210, TADT 1220.

TADT 1460 2D Graphics And Laser Etching (3 credits)
An introduction to the principles and practices of technical drawing. The course provides a working familiarity with computer-aided design and drafting through the study of multi-view, pictorial drawing systems, and their applications to laser etching.

TADT 1464 Engineering Technology Project I (3 credits)
This is a project based course that introduces fundamental concepts of engineering design, effective teams, lab safety, and engineering ethics. Basic mechanical systems and simple machines will also be covered. Students are required to demonstrate competency in scheduling, applying fabrication techniques, and documentation. Projects are presented at the end of the semester. Prerequisite: TADT 1210, PHYS 1101.

TADT 2100 Impact Of Technology, Art & Design (2 credits)
Defines technology and examines the relationship between technology, human civilization, and other disciplines. Course includes a focus on the related social, cultural, environmental and economic impacts of technology and encourages students to understand the development of technology from the earliest civilizations to implications for the 21st Century. This course is designed primarily for the liberal education program. Liberal Education Goal Areas 5 & 9.

TADT 2217 Strength of Materials (3 credits)
An introduction to stress, strain, and deformation analysis of materials subjected to axial, torsional, and bending loads. Basic mechanics concepts such as defects, elasticity, plasticity, and failure are introduced. Prerequisite: PHYS 1101.

TADT 2250 Built Environment (3 credits)
A broad study of the built environment and the technology that was used to create it. Emphasis is given to residential and light commercial applications of print-reading, materials, and methods, while exploring past and present construction technologies. Prerequisite: TADT 1220.

TADT 2252 Construction Materials and Methods (3 credits)
This course is a broad study of materials and methods used in the building and the construction industry. Emphasizing common construction systems such as light wood frame, masonry bearing wall, steel frame, and reinforced concrete construction, including information on building materials properties; "pre-engineered" building components; sustainability issues; and the latest building codes and standards. Prerequisite: TADT 1460, TADT 2250 or consent of the instructor.

TADT 2310 Small Gasoline Engines (3 credits)
The theory and operation of small 2 cycle and 4 cycle engines. Laboratory exercises and rebuilding of components and engines. Prerequisite: TADT 1315. (Might not be offered every year.)

TADT 2370 Automation Technology (3 credits)
An introduction to the field of automation as found in the industrial environment. Concepts of CNC, CAM PLC's, vision systems, bar coding and robotics are explored.

TADT 2450 Product Finishing & Aesthetics (3 credits)
The purpose of this course is to provide the student an understanding of materials, principles and techniques of spray finishing required to complete a professional model. Processes may include model construction, surface preparation, materials selection and paint application. Prerequisites: TADT 1210, TADT 1220, TADT 1460.

TADT 2461 Parametric 3D Modeling (3 credits)
Examines current topics, research, exploration, testing, and evaluation of computer-aided drafting and design programs for Windows computers. Prerequisites: TADT 1460 or consent of instructor.

TADT 2465 Engineering Technology Project II (3 credits)
This is a project based course that builds on topics covered in Engineering Project 1. Students will be introduced to electrical safety, electrical schematics, electrical circuits, various electrical components, and electrical measuring equipment. Students are required to demonstrate competency in applying fabrication and analysis techniques and setting performance specifications, meeting these specifications, and documenting their designs. Projects are presented at the end of the semester. Prerequisite: PHYS 1102, TADT 1220, TADT 1460 and TADT 1464.

TADT 2877 Engineering Problem Solving (3 credits)
Investigates the terminology, concepts, and analytical techniques essential to solving complex problems which occur in manufacturing.

TADT 3100 Principles of Professional Development (3 credits)
An overview for professionals in the fields of Technology & Management. The student will research and report on such topics as historical and future technological developments, personality inventories, trade and professional organizations, professional publications, and personal professional development plans. Educational degree requirements and policies to meet development plans are also reviewed. Prerequisites: Junior status or consent of instructor.

TADT 3111 Project Management Methodology (3 credits)
This course is intended to provide the learner with the understanding, tools and techniques necessary to effectively plan, coordinate and manage the combination of people, systems and other resources required to complete a project in alignment with established goals, standards and deadlines. In addition, elements of leadership principles and practices will be studied to support team development and project success.

TADT 3112 Leadership in a Team Environment (3 credits)
This course is intended to provide engineering and technology management students with the understanding, strategies, and methods necessary to engage, influence, and empower followers in the successful accomplishment of organizational goals as influenced by the engineering methodologies of discoveries in a team-based environment. Prerequisites: TADT 1111 or TADT 3111.

TADT 3217 Materials Science and Metallurgy (3 credits)
This course focuses on the properties of materials and is intended as an introduction to materials science. Materials are used in everything and many major engineering problems are materials problems. This course will provide students with the skills and knowledge necessary to solve many of these problems. This is primarily a lab based course that focuses on mechanical testing and structural analysis of polymers, metals, and ceramics. Prerequisites: TADT 2217, TADT 2877, MATH 1470, and junior status.

TADT 3240 Construction Materials and Practices (3 credits)
Comprehensive study of construction materials, their characteristics, applications and testing. Prerequisite(s): Junior status or consent of instructor.

TADT 3250 Print Reading and Project Documentation (3 credits)
An introductory course in production specifications and contract documentation usage. The course includes the study of materials, methods and labor functions as they relate to use of specifications, documentation and drawings in construction related industries. Prerequisite: TADT 2252 or consent of instructor.

TADT 3260 Project Bidding and Estimating (3 credits)
A foundational course in the analysis and determination of construction and manufacturing project costs. Bidding strategies and proposals; material, equipment and labor estimates, as well as overhead and profit are examined. Prerequisite: TADT 3250 or consent of instructor.

TADT 3267 Economic and Cost Analysis (3 credits)
Introduction to the methods for determining costs related to developing and producing a product, for analyzing the present and future value of liquid and physical assets, and for analyzing the present and future value of a time series of payments. Other topics include basic accounting practices, cost estimating, and forecasting. Prerequisite: Junior status or consent of instructor.

TADT 3277 Programmable Logic Controllers (3 credits)
This course offers students an in depth exposure to programmable logic controller (PLC) devices, the main components of PLC systems, and DC/AC motor and fluid power. The course will cover configuration and programming of PLCs for motor and hydraulic system control using various programming tools. Prerequisite: PHYS 1102 and junior status.

TADT 3330 Industrial Automation (3 credits)
The integration of robotics and automated controls into manufacturing operations. Topics include planning for, specifying, and integrating sensors, actuators, part feeding devices, fixtures, material handling equipment, robotics, and programmable logic controllers in an automated environment, such as a work cell or an assembly line. Two hours lecture and two hours lab per week. Prerequisite(s): Junior status or consent of instructor.

TADT 3350 General Power (3 credits)
Theory and operating principles of internal combustion engines with over fifty cubic inches of displacement. Laboratory experiences include rebuilding procedures and related technical specifications and data. Prerequisite(s): Junior status or consent of instructor.

TADT 3462 Computer Controlled Machining (3 credits)
Introduction to computer-controlled machining operations including manual programming and programming using CAM application for CNC (computer controlled machining). Emphasis on tools and materials are applied in a wide variety of manufacturing and modeling operations. Prerequisite: TADT 2461.

TADT 3470 Concept to Prototype Model (3 credits)
Construct a prototype model with emphasis on 3D parametric drawing, 3D printing technology and various machining processes. Project will concentrate on form, fit, function, structural integrity and optimization of the design needed to shape concepts and test ideas. Prerequisite: TADT 1450, TADT 2450, TADT 3462.

TADT 3537 Industrial Design/Innovation (3 credits)
Exploration of the history, philosophy and application of industrial design. Includes defining specific customer needs and the research, identification, testing, assessment and implementation of effective solutions to technological problems. Also included is the development of a design proposal, written and graphic documentation, and the ethical, environmental, social and economic impacts of design solutions. Incorporates the role, purpose and relationship of innovation in business and industry with the design process. Prerequisite(s): Junior status or consent of instructor.

TADT 3570 Commercial Architecture (3 credits)
Planning and design of commercial buildings and their structural systems, city and industrial planning, and landscaping. Might not be offered every year. Prerequisite(s): Junior status or consent of instructor.

TADT 3610 Industrial Prototypes (3 credits)
Development of industrial quality prototypes from engineering or designer prints. Includes the selection of materials and processes for production feasibility and market testing prototypes. Prerequisites: Junior status or consent of instructor.

TADT 3700 Operations Planning and Control (3 credits)
The concepts, tools, techniques, and quantitative methods used to plan for and control operations in the production of goods and services. Topics include, but are not limited to, traditional inventory management, just-in-time inventory, materials- and enterprise-resource planning, facilities location and layout, process strategies, aggregate planning, scheduling, maintenance and reliability, project management, and supply chain management. Prerequisite: Junior status or consent of instructor.

TADT 3850 Foundation of Technology Education (2 credits)
Survey of the history, philosophy, curriculum, and instructional practices of the industrial technology education field. Emphasizes the goals and objectives of technology education programs in the K-12 public school system. Includes current issues, career options, professional organizations, and licensure requirements. Prerequisite(s): Junior status or consent of instructor.

TADT 3857 Methods of Teaching Industrial Technology/Vocational Education (4 credits)
Approaches and delivery strategies for teaching technology education. Instructional technologies, records management, lesson planning and classroom practice. Prerequisites: Junior status or consent of instructor.

TADT 3878 Industrial/Engineering Production Studies (3 credits)
Study and visitations/assessments of the various aspects of industry, particularly in the engineering and technology management fields. The strategy of benchmarking will be used as a primary tool to complete course research. Prerequisites: Junior status or consent of instructor.

TADT 3879 Performance Measurement (3 credits)
The establishment of time standards essential to the decision making, forecasting, and process control efforts of manufacturing engineering groups and operations management. Prerequisites: Junior status or consent of instructor.

TADT 3885 Technical Sales, Service and Training (3 credits)
The philosophy and practice of sales and service in a technical environment, including the methodology, planning and design of sales activity, and developing technical proposals and presentations. Course also examines aspects of assessing, designing and implementing human resource training programs. Prerequisites: Junior status or consent of instructor.

TADT 3887 Safety and Risk Management (3 credits)
Introduction to the general principles, regulations, responsibilities, policies and practices associated with Safety and Risk Management from the perspective of a manager in operations, facilities and/or construction. Prerequisites: Junior status or consent of the instructor

TADT 3897 Ergonomics and Human Factors (3 credits)
Students learn how to apply human-centered design principles to minimize the risk of harm while simultaneously facilitating the use of man-made artifacts. These principles may be applied in the work environment to design or improve work methods and work environments. They may also be used in the design of consumer goods. Includes a course project and lab activities. Two hours lecture and two hours lab per week. Prerequisites: Junior status or consent of instructor.

TADT 3970 Internship (1-3 credits)
Internship

TADT 4259 Construction Management (3 credits)
An advanced study of construction project planning, contracting, and supervision. The management functions of a construction business environment are emphasized. Attention is given to the differences between construction management and construction contracting as well as a focus on the concept of green building. Prerequisites: Junior status or consent of instructor.

TADT 4260 Computerized Construction Estimating (3 credits)
An exploration and study of computerized construction estimating methods, software, and approaches for estimating, planning, and documenting construction projects. Prerequisite: TADT 3260 or consent of instructor.

TADT 4340 Industrial Controls (4 credits)
A study of industrial controls including electromechanical devices, programmable logic controllers and computer control. Prerequisites: Junior status or consent of instructor.

TADT 4349 Principles of Technology (3 credits)
A laboratory based study of electrical, mechanical, thermal and optical systems which combines theory and practice to develop an understanding of technological systems based on mathematical and physical models. Prerequisites: Junior status or consent of instructor.

TADT 4370 Computer Integrated Manufacturing (3 credits)
Study of how to synchronize operations in an environment that incorporates automated production equipment, material handling systems, plant control systems, design engineering functions, production- and inventory-control systems, and various management functions. Prerequisites: Junior status or consent of instructor.

TADT 4385 Sustainability and Emerging Technologies (3 credits)
A study of sustainability and the emerging technologies that support its major concepts in a laboratory-based course. Students will experience a variety of emerging technologies and understand how such content may be applied in design, engineering, manufacturing and/or the construction industries. Prerequisites: Junior status or consent of instructor.

TADT 4460 Design for Manufacturability (3 credits)
A study of the tools, techniques, and guidelines used to design parts and products, while minimizing costs, facilitating manufacturing operations, maximizing quality and functionality, and supporting modern production management techniques. Prerequisites: Junior status or consent of instructor.

TADT 4464 Machine Element Design (3 credits)
Application of mechanical principles, such as physics, stress analysis, motion analysis, mechanical power, fluid power, fastening and joining techniques, and electric motor selection/control to the design of components and mechanisms. Prerequisites: Junior status or consent of instructor.

TADT 4465 Mechanical Analysis of Parametric 3D Models (3 credits)
The use of a parametric 3D CAD package, in conjunction with either add-on or third-party software applications, to create virtual part and assembly models, and to analyze their physical performance using computer simulation techniques. Topics include shape optimization, and stress-, fatigue-, and kinematic-analysis, plus additional analysis techniques as planned by the instructor. Prerequisites: Junior status or consent of instructor.

TADT 4589 Advanced Prototype Project (3 credits)
Capstone Project: Construct a highly detailed professional model utilizing a culmination of skills including traditional, non-traditional and 3D printing technologies. Project documentation will be a high priority. This project may be constructed in collaboration with an industry professional. Prerequisites: TADT 3470 and Senior level status or consent of instructor.

TADT 4778 Advanced Topics in Technology (3 credits)
Current topics, or emerging research or exploration and assessment of topics in the applied engineering, industrial technology, and/or technology management fields, or any related field. Prerequisites: Junior status or consent of the instructor.

TADT 4812 Leadership Mentoring (1 credit)
Introduction to leadership principles in practice through the shadowing of a volunteer mentor currently working in a senior leadership role of a local private sector organization. The student will observe how leadership provides direction and guidance in alignment of their respective organizations toward a common goal and in support of specific performance objectives. Prerequisites: Junior status or consent of the instructor.

TADT 4820 Engineering Case Study (3 credits)
Study and development of a solution to a new or existing engineering-related problem. Students propose an appropriate case within their field of interest to be given approval by the instructor. Based on instructor approval, students submit a case study which documents the proposal, implementation strategy, and results of the proposal.

TADT 4830 Foundations in Career and Technical Education (2 credits)
Students will research learning theory and demonstrate basic instructional competencies unique to career & technical education, including philosophy, methods of teaching, and student assessment. Course also addresses the inclusion of teaching strategies in reading, reading comprehension and writing. Prerequisites: Junior status or consent of instructor.

TADT 4837 Evaluation in Career and Technical Education (2 credits)
A study of testing and measurement techniques and applications in occupational programs. The construction of teacher-made performance test, written tests, rating scales and checklists is emphasized. Vendor and standardized are included. Prerequisites: Junior status or consent of instructor.

TADT 4839 Industrial/Career and Technical Education Student Organization (2 credits)
Acquaints students with the issues of planning and implementation of student organizations. Also includes student organizations at the secondary and post-secondary levels and their relationship to state and federal policy and legislation. Prerequisites: Junior status or consent of instructor.

TADT 4847 Methods of Teaching Career and Technical Education (2 credits)
Instructional methodology used in the implementation of occupationally and technically orientated curriculum. Prerequisites: Junior status or consent of instructor.

TADT 4849 Classroom Management in Career and Technical Education (2 credits)
Managing the career and technical education learning classroom, including impact on effective teaching approaches, laboratory safety, material purchase and inventory, equipment purchase and maintenance, and program budgeting. Prerequisites: Junior status or consent of instructor.

TADT 4850 Philosophy of Career and Technical Education (2 credits)
A study of the history, philosophy, and practices of career and technical education. Includes a survey of curriculum characteristics, certification requirements, professional organizations, and career options. Prerequisites: Junior status or consent of instructor.

TADT 4858 Curriculum Development in Technology Education & Career & Technical Ed (2 credits)
The philosophy of curriculum and course construction. Gives special attention to the formulation of purposes, selection and sequence of activities and learner outcomes and assessment. Prerequisites: Junior status or consent of instructor.

TADT 4859 Special Needs in Career and Technical Education (2 credits)
Objectives, materials, and methods of developing and modifying curriculum in the various vocational fields for students with special needs. Prerequisites: Junior status or consent of instructor.

TADT 4860 Management In Industrial Technology Education (4 credits)
Managing the learning environment, budget, equipment and student projects in the technology education setting, Also covers safety considerations and investigates strategies for learning within the technological clusters and for accommodating special needs students. Prerequisites: Junior status or consent of instructor.

TADT 4867 Lean Principles and Practices (3 credits)
This course teaches the principles and practical application of Lean methods and tools as they would apply in various types of organizational value streams allowing for continuously improving operational performances that are fast, flexible, focused and organizationally inclusive for all stakeholders. Prerequisites: Junior status or consent of the instructor.

TADT 4873 Emphasis Related Capstone (3 credits)
A multifaceted project that utilizes the students culminating academic and intellectual experience to think critically, solve a challenging problem, and develop a solution using oral communication, public speaking, research skills, media literacy, teamwork, planning, self-sufficiency, or goal setting. Prerequisites: Senior status or consent of the instructor.

TADT 4875 Facilities Management (3 credits)
This course is an exploration of the concepts and organization of an integrated approach to operating, maintaining, improving and adapting the buildings and infrastructure of an organization/institution in order to create an environment that strongly supports the primary objectives of the organization. Prerequisite: Junior status or consent of instructor. Prerequisites: Junior status or consent of instructor.

TADT 4878 Quality Assurance (3 credits)
The course teaches the theory and applications of statistical analysis, quality problem solving and implementation. Prerequisites: Junior status or consent of instructor.

TADT 4879 Service Process/Improvement (3 credits)
The design and improvement of work processes in the service industries and in the service functions of manufacturing organizations. Topics include, but are not limited to, the tools and techniques required for designing, setting up, and managing service systems; improving service quality; the impacts of technology on service management; managing nonprofit service organizations; services strategies; and the positioning and marketing of services. Prerequisites: Junior status or consent of instructor.

TADT 4880 Total Quality Management (3 credits)
An overview of the current quality control management techniques including process capability, action research and the international standards organization (ISO 9000). Prerequisites: Junior status or consent of instructor.

TADT 4887 Career Development Theory and Practice (2 credits)
A course designed to acquaint professionals with the various phases of lifetime career development. Strategies are reviewed to provide a comprehensive understanding of career awareness and the role that it plays in the life of each individual and society. Prerequisites: Junior status or consent of instructor.

TADT 4888 Work/Occupational Assessment of Learners (2 credits)
An investigation of the use of informal and formal techniques used in the design and implementation of occupational assessment with school systems. Prerequisites: Junior status or consent of instructor.

TADT 4889 Coordination Techniques of Career and Technical Education (2 credits)
The course involves the role of teacher-coordinators in the design and implementation of internships and other cooperative experimental learning methods. Prerequisites: Junior status or consent of instructor.

TADT 4893 Applied Project Management (3 credits)
This course is intended to provide the learner with the understanding, tools, and techniques necessary to effectively plan, coordinate and manage the combination of people, systems and other resources required to complete a project in alignment with established objectives, standards and deadlines. Prerequisite: (TADT 1111 or TADT 3111) and TADT 3112 or consent of instructor.

TADT 4898 Simulation of Industrial Processes (3 credits)
Application of computer-based, discrete event simulation to improve or design work processes in business and industry. Emphasizes building mathematical systems models of work processes to be analyzed and optimized using simulation software such as, but not limited to, Promodel or Arena. Two hours lecture and two hours computer lab per week. Prerequisites: Junior status or consent of instructor.

TADT 4899 Design of Experiments (3 credits)
Planning, execution, and analysis of factorial-based industrial experiments. Topics include, but are not limited to, analysis of variance, fitting of regression models, two-level factorial designs, blocking strategies and confounding of variables, fractional factorial designs, response surface methods, nested and split-plot designs, three-level and mixed-level designs, and experiments with random factors. Prerequisites: Junior status or consent of instructor.

TADT 4970 Internship (1-12 credits)
Prerequesites: Junior status or consent of instructor.

All-University Courses

The course numbers listed below, not always included in the semester class schedule, may be registered for by consent of the advisor, instructor, or department chair, or may be assigned by the department when warranted. Individual registration requires previous arrangement by the student and the completion of any required form or planning outline as well as any prerequisites.

1910, 2910, 3910, 4910 DIRECTED INDEPENDENT STUDY
1920, 2920, 3920, 4920 DIRECTED GROUP STUDY
1930, 2930, 3930, 4930 EXPERIMENTAL COURSE
1940, 2940, 3940, 4940 IN-SERVICE COURSE
1950, 2950, 3950, 4950 WORKSHOP, INSTITUTE, TOUR
1960, 2960, 3960, 4960 SPECIAL PURPOSE INSTRUCTION
1970, 2970, 3970, 4970 INTERNSHIP
1980, 2980, 3980, 4980 RESEARCH
1990, 2990, 3990, 4990 THESIS