Technology, Art & Design

The Department of Technology, Art & Design offers a variety of programs that span the application of technology, art and design in response to a range of human wants and needs. Courses nurture the development of individual creative expression, critical thinking and problem solving skills. Degree programs foster the development of knowledge and skills to design and develop creative solutions that address operations and future needs in an array of cultural, design, business, technological and industrial settings.

The department offers a nationally accredited* Bachelor of Science program in Engineering Technology, with specializations in Construction Management and Manufacturing Management. Along with the associated Bachelor of Applied Science programs in Applied Engineering and Technology Management, these degree options offer both four-year and transfer students the opportunity to prepare for leadership roles in a wide range of technologically based enterprises including but not limited to the fields of construction, energy, manufacturing and sustainability.

Transfer students have the option to enroll in either the Bachelor of Applied Science program in Applied Engineering or Technology Management. Both degrees are offered as "2 + 2**" programs online or on campus for working professionals who have either an Associate of Science degree, Associate of Applied Science degree, diploma or certificate and wish to complete a Bachelor's degree.

The Bachelor of Science in Design offers students a unique and exciting opportunity to pursue careers that demand excellence in a combination of technical, creative, and artistic capabilities. Students can pursue specializations in Studio Arts, Graphic Design or Exhibit Design. All Design students benefit from a portfolio review process, a graduation requirement that offers them the opportunity to present their professional portfolios to leaders in their industries from across the nation. Students transferring from a Minnesota State Community and/or Technical College with an Associate degree in a related design field may be eligible for articulated transfer into the Design program.

The Department of Technology, Art & Design offers five exhibition spaces that present local, regional, national and international exhibits. The gallery program also maintains permanent collections in ceramics and prints.

*The BS in Engineering Technology is accredited by the Association of Technology, Management, and Applied Engineering (http://atmae.org).

**May vary based on the individual's degree being transferred to the university, and the number of general education (Liberal Education) credits and technical or professional credits.

Programs

- Applied Engineering, B.A.S. *major*
- Applied Management, B.A.S. *major*
- Design, B.S. (Exhibit Design Emphasis) *major*
- Design, B.S. (Graphic Design Emphasis) *major*
- Design, B.S. (Studio Arts Emphasis) *major*
- Design, B.S. (Model Design Emphasis) *major*
- Engineering Technology, B.S. *major*
- Project Management, B.S. (Product Development Emphasis) *major*
- Project Management, B.S. (Operations Management Emphasis) *major*
- Project Management, B.S. (Construction and Facility Management Emphasis) *major*
- Design *minor*
- Engineering Technology *minor*
- Project Management *minor*
- Studio Arts *minor*
- Lean Six Sigma *cert*
- Technology Manager *cert*

Career Directions

Applications Engineering
Art Director
Artist/Technician
Construction Management
Construction Management Engineer
Engineer
Exhibit Designer
Field Engineer
Graphic Designer
Industrial/Architectural Rendering
Management
Manufacturing Engineering
Model Building
Multimedia Specialist/Designer
Pre-press Production
Print Production
Process Planning
Quality Control Engineering
Research and Development
Safety Engineer
Teaching
Technical Sales
Web Page Development
Also: Graduate Study

Preparation

Recommended High School Courses
Project Lead the Way classes
Drafting
Graphic Arts
Production
Construction
Manufacturing
Electronics
Robotics
Art/Fine Arts
CADD/Computer Programming

Applied Engineering, B.A.S. *major*

Required Credits: 78
Required GPA: 2.25

I TADT COMMON CORE

COMPLETE THE FOLLOWING COURSES:

- TADT 3111 Project Management Methodology (3 credits)
- TADT 3267 Economic and Cost Analysis (3 credits)
- TADT 4385 Sustainability and Emerging Technologies (3 credits)
- TADT 4873 Emphasis Related Capstone (3 credits)
- TADT 4878 Quality Assurance (3 credits)

II APPLIED ENGINEERING CORE

COMPLETE THE FOLLOWING COURSES:

- TADT 3100 Principles of Professional Development (3 credits)
- TADT 3217 Materials Science and Metallurgy (3 credits)
- TADT 3537 Industrial Design/Innovation (3 credits)
- TADT 3700 Operations Planning and Control (3 credits)
- TADT 3887 Safety and Risk Management (3 credits)
- TADT 4867 Lean Principles and Practices (3 credits)
- TADT 4879 Service Process/Improvement (3 credits)

III TRANSFER TECHNICAL BLOCK

Requires 38 technical credits transferred from an A.S. or A.A.S. degree, or a diploma (e.g., Manufacturing Technology, Automation Technology)

IV REQUIRED TADT ELECTIVES

SELECT 4 CREDITS OF UPPER DIVISION (3000/4000) TADT ELECTIVES WITH ADVISOR APPROVAL.

PROGRAM LEARNING OUTCOMES | APPLIED ENGINEERING, B.A.S.

1. Readiness for Career: Students will apply resource management skills to

address real world problems.

2. Higher Order Thinking: Students will analyze, design, and implement solutions to current industry needs.

3. Communication & Leadership: Students will demonstrate professional communication skills, ethical behavior, and effective team participation.

4. Knowledge, Values, & Abilities: Students will employ value-added skills in real world applications that reflect the needs of industry.

SUGGESTED SEMESTER SCHEDULE APPLIED ENGINEERING, B.A.S.

Freshman

- TADT3100
- TADT3267
- TADT3111
- TADT3700
- Liberal Education Requirements

Sophomore

- TADT3217
- TADT3537
- TADT3887
- TADT4385
- Liberal Education Requirements

Junior

- TADT4867
- TADT4879
- Upper Division TADT Elective with Advisor Approval
- Liberal Education Requirements

Senior

- TADT4873
- TADT4878
- Liberal Education Requirements

Applied Management, B.A.S. *major*

The Applied Management program is designed to prepare individuals to pursue a variety of technology-related management career paths in business or industry. **The program is designed specifically for individuals who possess a two-year technical degree and are interested in advancing their professional career.** The program permits students to apply their 2-year technical degree credits toward a baccalaureate degree. Coupled with a two-year technical/applied degree providing a focused foundation, students complete junior and senior-level courses covering a broad range of technology and applied management concepts and applications. This breadth provides maximum flexibility for graduates to pursue diverse employment opportunities. Completion of the degree is available through a web-based distance delivery format. Students should work closely with an advisor to obtain program and course selection information.

Required Credits: 60
Required GPA: 2.25

TRANSFER DEGREE CREDITS

A minimum of 30 credits must be transferred from an AS degree, AAS degree, diploma or certificate. Additional transfer credits will be accepted as general elective credits and will count toward the 120 credit requirement for a bachelor's degree.

I REQUIRED FOUNDATION CORE

COMPLETE THE FOLLOWING COURSES:

- ACCT 1100 Financial Literacy (3 credits)
- ACCT 2101 Principles of Accounting I (3 credits)
- ECON 2000 Markets and Resource Allocation (3 credits)
- ECON 2100 Macroeconomics and the Business Cycle (3 credits)
- MATH 1100 Mathematical Reasoning (3 credits)
- TADT 2100 Impact Of Technology, Art & Design (2 credits)

II REQUIRED MAJOR CORE

COMPLETE THE FOLLOWING COURSES:

- TADT 3100 Principles of Professional Development (3 credits)
- TADT 3111 Project Management Methodology (3 credits)
- TADT 3112 Leadership in a Team Environment (3 credits)
- TADT 3267 Economic and Cost Analysis (3 credits)
- TADT 3700 Operations Planning and Control (3 credits)
- TADT 4385 Sustainability and Emerging Technologies (3 credits)
- TADT 4873 Emphasis Related Capstone (3 credits)
- TADT 4875 Facilities Management (3 credits)
- TADT 4878 Quality Assurance (3 credits)
- TADT 4880 Total Quality Management (3 credits)

III ADVISOR APPROVED CAREER RELATED ELECTIVE COURSES

SELECT 13 CAREER RELATED OR LIBERAL EDUCATION/MNTC CREDITS WITH ASSISTANCE FROM A FACULTY ADVISOR TO COMPLETE GRADUATION REQUIREMENTS. (10 OF THESE MAY NEED TO BE UPPER DIVISION CREDITS)

SUGGESTED SEMESTER SCHEDULE FOR: APPLIED MANAGEMENT, B.A.S.

Semester 1 Fall

- ACCT 1100 Financial Literacy (3 credits)
- ACCT 2101 Principles of Accounting I (3 credits)
- MATH 1100 Mathematical Reasoning (3 credits)
- TADT 2100 Impact Of Technology, Art & Design (2 credits)

Semester 2 Spring

- ECON 2000 Markets and Resource Allocation (3 credits)
- ECON 2100 Macroeconomics and the Business Cycle (3 credits)
- TADT 3112 Leadership in a Team Environment (3 credits)
- Advisor Approved Career Related Elective Courses (6 credits)

Semester 3 Summer

- TADT 3700 Operations Planning and Control (3 credits)
- TADT 4385 Sustainability and Emerging Technologies (3 credits)
- TADT 4880 Total Quality Management (3 credits)

Semester 4 Fall

- TADT 3100 Principles of Professional Development (3 credits)
- TADT 3111 Project Management Methodology (3 credits)
- TADT 3267 Economic and Cost Analysis (3 credits)
- Advisor Approved Career Related Elective Courses (6 credits)

Semester 5 Spring

- TADT 4873 Emphasis Related Capstone (3 credits)
- TADT 4875 Facilities Management (3 credits)
- TADT 4878 Quality Assurance (3 credits)
- Advisor Approved Career Related Elective Courses (5 credits)

Design, B.S. *major*
Exhibit Design Emphasis

Required Credits: 68
Required GPA: 2.25

REQUIRED CORE COURSES

COMPLETE THE FOLLOWING COURSES:

- TADD 1430 Design Foundations (4 credits)
- TADD 1440 Drawing Foundations (4 credits)
- TADD 2440 2D Design Software (4 credits)
- TADD 3440 3D Design Software (4 credits)
- TADD 3450 History of Modern Design (4 credits)

EXHIBIT DESIGN EMPHASIS

COMPLETE THE FOLLOWING COURSES:

- TADD 3420 Introduction to Exhibit Design (4 credits)
- TADD 3430 Introduction to Graphic Design (4 credits)
- TADD 3548 Advanced 3D Design (4 credits)
- TADD 3549 Interactive Design (4 credits)
- TADD 3568 Exhibit Design/Trade Show (4 credits)
- TADD 3569 Exhibit Design/Environments (4 credits)
- TADD 3578 Typography (4 credits)
- TADD 3579 Branding and Packaging (4 credits)
- TADD 3648 Color Theory (4 credits)
- TADD 4549 Advanced Media Design (4 credits)
- TADD 4569 Advanced Exhibit Design (4 credits)

COMPLETE THE FOLLOWING COURSE:

- TADD 3900 Junior Culmination (2 credits)

COMPLETE THE FOLLOWING COURSE:

- TADD 4900 Senior Culmination (2 credits)

Design, B.S. *major*
Graphic Design Emphasis

Required Credits: 68
Required GPA: 2.25

REQUIRED CORE COURSES

COMPLETE THE FOLLOWING COURSES:

- TADD 1430 Design Foundations (4 credits)
- TADD 1440 Drawing Foundations (4 credits)
- TADD 2440 2D Design Software (4 credits)
- TADD 3440 3D Design Software (4 credits)
- TADD 3450 History of Modern Design (4 credits)

GRAPHIC DESIGN EMPHASIS

COMPLETE THE FOLLOWING COURSES:

- TADD 3420 Introduction to Exhibit Design (4 credits)
- TADD 3430 Introduction to Graphic Design (4 credits)
- TADD 3548 Advanced 3D Design (4 credits)
- TADD 3549 Interactive Design (4 credits)
- TADD 3568 Exhibit Design/Trade Show (4 credits)
- TADD 3569 Exhibit Design/Environments (4 credits)
- TADD 3578 Typography (4 credits)
- TADD 3579 Branding and Packaging (4 credits)
- TADD 3648 Color Theory (4 credits)
- TADD 4549 Advanced Media Design (4 credits)
- TADD 4579 Advanced Graphic Design (4 credits)

COMPLETE THE FOLLOWING COURSE:

- TADD 3900 Junior Culmination (2 credits)

COMPLETE THE FOLLOWING COURSE:

- TADD 4900 Senior Culmination (2 credits)

Design, B.S. *major*
Studio Arts Emphasis

Required Credits: 68
Required GPA: 2.25

REQUIRED CORE COURSES

COMPLETE THE FOLLOWING COURSES:

- TADD 1430 Design Foundations (4 credits)
- TADD 1440 Drawing Foundations (4 credits)
- TADD 2440 2D Design Software (4 credits)
- TADD 3440 3D Design Software (4 credits)
- TADD 3450 History of Modern Design (4 credits)

STUDIO ARTS EMPHASIS

COMPLETE THE FOLLOWING COURSES:

- TADD 1460 Introduction to Digital Photography (4 credits)
- TADD 2317 Painting: Watercolor (4 credits)
- TADD 2319 Painting: Oil (4 credits)
- TADD 2517 Printmaking: Relief (4 credits)
- TADD 2519 Printmaking: Silkscreen/Intaglio (4 credits)
- TADD 3648 Color Theory (4 credits)
- TADD 3658 Drawing: Figure (4 credits)
- TADD 3659 Drawing: Still Life (4 credits)
- TADD 3748 Ceramics/Hand Building (4 credits)
- TADD 3749 Ceramics/Wheel (4 credits)
- TADD 4659 Art History (4 credits)

COMPLETE THE FOLLOWING COURSE:

- TADD 3900 Junior Culmination (2 credits)

COMPLETE THE FOLLOWING COURSE:

- TADD 4900 Senior Culmination (2 credits)

Design, B.S. *major*
Model Design Emphasis

The Model Design Emphasis prepares students with the knowledge, skills and expertise required to create and construct tangible three-dimensional scale models. Utilizing a process of creativity, innovation and design students will have the opportunity to familiarize themselves with a variety of model making disciplines. (e.g., Consumer Products, Medical, Toys, Prototypes, Industrial Design, Architectural, 3D Printing and Engineering).

Screening: All Design Majors are required to pass a screening process in order to register for Junior Culmination and Senior Culmination. The screening process will take place during the fall of the student's Junior and Senior year.

Required Credits: 68
Required GPA: 2.25

REQUIRED CORE COURSES

COMPLETE THE FOLLOWING COURSES:

- TADD 1430 Design Foundations (4 credits)
- TADD 1440 Drawing Foundations (4 credits)
- TADD 2440 2D Design Software (4 credits)
- TADD 3440 3D Design Software (4 credits)
- TADD 3450 History of Modern Design (4 credits)

MODEL DESIGN EMPHASIS

COMPLETE THE FOLLOWING COURSES:

- TADD 3430 Introduction to Graphic Design (4 credits)
- TADD 3548 Advanced 3D Design (4 credits)
- TADD 3568 Exhibit Design/Trade Show (4 credits)
- TADD 3579 Branding and Packaging (4 credits)
- TADD 4549 Advanced Media Design (4 credits)
- TADT 1111 Introduction to Project Management (3 credits)
- TADT 1220 Introduction to Manufacturing Processes II (3 credits)
- TADT 1450 Introduction to Product Development (3 credits)
- TADT 2450 Product Finishing & Aesthetics (3 credits)
- TADT 2461 Parametric 3D Modeling (3 credits)
- TADT 3462 Computer Controlled Machining (3 credits)
- TADT 3470 Concept to Prototype Model (3 credits)
- TADT 4589 Advanced Prototype Project (3 credits)

COMPLETE THE FOLLOWING COURSE:

- TADD 3900 Junior Culmination (2 credits)

COMPLETE THE FOLLOWING COURSE:

- TADD 4900 Senior Culmination (2 credits)

Engineering Technology, B.S. *major*

Required Credits: 79
Required GPA: 2.25

I TADT COMMON CORE

COMPLETE THE FOLLOWING COURSES:

- TADT 1111 Introduction to Project Management (3 credits)
- TADT 3267 Economic and Cost Analysis (3 credits)
- TADT 4385 Sustainability and Emerging Technologies (3 credits)
- TADT 4873 Emphasis Related Capstone (3 credits)
- TADT 4878 Quality Assurance (3 credits)

COMPLETE THE FOLLOWING COURSE FOR 1 CREDIT:

- TADT 3970 Internship (1-3 credits)

COMPLETE THE FOLLOWING COURSE FOR 2 CREDITS:

- TADT 4970 Internship (1-12 credits)

II ENGINEERING TECHNOLOGY CORE COURSES

COMPLETE THE FOLLOWING COURSES:

- MATH 1470 Precalculus (5 credits)
- PHYS 1101 General Physics I (4 credits)
- PHYS 1102 General Physics II (4 credits)
- TADT 1210 Introduction to Manufacturing Processes I (3 credits)
- TADT 1220 Introduction to Manufacturing Processes II (3 credits)
- TADT 1460 2D Graphics And Laser Etching (3 credits)
- TADT 1464 Engineering Technology Project I (3 credits)
- TADT 2100 Impact Of Technology, Art & Design (2 credits)
- TADT 2217 Strength of Materials (3 credits)
- TADT 2461 Parametric 3D Modeling (3 credits)
- TADT 2465 Engineering Technology Project II (3 credits)
- TADT 2877 Engineering Problem Solving (3 credits)
- TADT 3217 Materials Science and Metallurgy (3 credits)
- TADT 3277 Programmable Logic Controllers (3 credits)
- TADT 3462 Computer Controlled Machining (3 credits)
- TADT 3537 Industrial Design/Innovation (3 credits)
- TADT 4778 Advanced Topics in Technology (3 credits)

III REQUIRED FOUNDATION COURSES

SELECT 7 CREDITS FROM THE FOLLOWING:

- TADD 3440 3D Design Software (4 credits)
- TADD 3450 History of Modern Design (4 credits)
- TADD 3579 Branding and Packaging (4 credits)
- TADT 3250 Print Reading and Project Documentation (3 credits)
- TADT 4589 Advanced Prototype Project (3 credits)
- TADT 4880 Total Quality Management (3 credits)

Project Management, B.S. *major*
Product Development Emphasis

The Project Management degree prepares graduates for planning and managing resources under the constraints of scope, cost and time to successfully achieve a specific, unique objective. This program addresses the tools, skills and knowledge necessary to initiate, plan, implement and evaluate projects to deliver solutions. Program disciplines include: safety and risk management, leadership, quality assurance, technical sales, training, sustainability, engineering economics and cost analysis. Project Management majors have the option to select from three distinct technology related emphases: Construction and Facility Management, product Development or Operations Management. Technical credits may be transferred in with the help of an advisor.

Required Credits: 72
Required GPA: 2.25

I TADT COMMON CORE

COMPLETE THE FOLLOWING COURSES:

- TADT 1111 Introduction to Project Management (3 credits)
- TADT 3267 Economic and Cost Analysis (3 credits)
- TADT 4385 Sustainability and Emerging Technologies (3 credits)
- TADT 4873 Emphasis Related Capstone (3 credits)
- TADT 4878 Quality Assurance (3 credits)

COMPLETE THE FOLLOWING COURSE FOR 1 CREDIT:

- TADT 3970 Internship (1-3 credits)

COMPLETE THE FOLLOWING COURSE FOR 2 CREDITS:

- TADT 4970 Internship (1-12 credits)

II PROJECT MANAGEMENT CORE COURSES

COMPLETE THE FOLLOWING COURSES:

- ACCT 2101 Principles of Accounting I (3 credits)
- BUAD 2220 Legal Environment (3 credits)
- BUAD 2280 Computer Business Applications (3 credits)
- TADT 1460 2D Graphics And Laser Etching (3 credits)
- TADT 2877 Engineering Problem Solving (3 credits)
- TADT 3112 Leadership in a Team Environment (3 credits)
- TADT 3885 Technical Sales, Service and Training (3 credits)
- TADT 4875 Facilities Management (3 credits)
- TADT 4893 Applied Project Management (3 credits)

PRODUCT DEVELOPMENT EMPHASIS

COMPLETE THE FOLLOWING COURSES:

- TADT 1210 Introduction to Manufacturing Processes I (3 credits)
- TADT 1220 Introduction to Manufacturing Processes II (3 credits)
- TADT 1450 Introduction to Product Development (3 credits)
- TADT 2450 Product Finishing & Aesthetics (3 credits)
- TADT 2461 Parametric 3D Modeling (3 credits)
- TADT 3462 Computer Controlled Machining (3 credits)
- TADT 3470 Concept to Prototype Model (3 credits)
- TADT 3537 Industrial Design/Innovation (3 credits)
- TADT 4589 Advanced Prototype Project (3 credits)

SUGGESTED SEMESTER SCHEDULE PROJECT MANAGEMENT, B.S. PRODUCT DEVELOPMENT EMPHASIS

Freshman

- ACCT 2101 Principles of Accounting I (3 credits)
- BUAD 2280 Computer Business Applications (3 credits)
- TADT 1111 Introduction to Project Management (3 credits)
- TADT 1210 Introduction to Manufacturing Processes I (3 credits)
- TADT 1220 Introduction to Manufacturing Processes II (3 credits)
- TADT 1450 Introduction to Product Development (3 credits)
- TADT 1460 2D Graphics And Laser Etching (3 credits)
- Liberal Education Requirements

Sophomore

- BUAD 2220 Legal Environment (3 credits)
- TADT 2450 Product Finishing & Aesthetics (3 credits)
- TADT 2461 Parametric 3D Modeling (3 credits)
- TADT 2877 Engineering Problem Solving (3 credits)
- TADT 3462 Computer Controlled Machining (3 credits)
- Liberal Education Requirements

Sophomore - Summer

- TADT 3970 Internship (1-3 credits)
  Internship for 1 Credit

Junior

- TADT 3112 Leadership in a Team Environment (3 credits)
- TADT 3267 Economic and Cost Analysis (3 credits)
- TADT 3470 Concept to Prototype Model (3 credits)
- TADT 3537 Industrial Design/Innovation (3 credits)
- TADT 3885 Technical Sales, Service and Training (3 credits)
- Elective
- Liberal Education Requirements

Junior - Summer

- TADT 4970 Internship (1-12 credits)
  Internship for 2 Credits

Senior

- TADT 4385 Sustainability and Emerging Technologies (3 credits)
- TADT 4589 Advanced Prototype Project (3 credits)
- TADT 4873 Emphasis Related Capstone (3 credits)
- TADT 4875 Facilities Management (3 credits)
- TADT 4878 Quality Assurance (3 credits)
- TADT 4893 Applied Project Management (3 credits)
- Elective
- Liberal Education Requirements

Project Management, B.S. *major*
Operations Management Emphasis

The Project Management degree prepares graduates for planning and managing resources under the constraints of scope, cost and time to successfully achieve a specific, unique objective. This program addresses the tools, skills and knowledge necessary to initiate, plan, implement and evaluate projects to deliver solutions. Program disciplines include: safety and risk management, leadership, quality assurance, technical sales, training, sustainability, engineering economics and cost analysis. Project Management majors have the option to select from three distinct technology related emphases: Construction and Facility Management, product Development or Operations Management. Technical credits may be transferred in with the help of an advisor.

Required Credits: 72
Required GPA: 2.25

I TADT COMMON CORE

COMPLETE THE FOLLOWING COURSES:

- TADT 1111 Introduction to Project Management (3 credits)
- TADT 3267 Economic and Cost Analysis (3 credits)
- TADT 4385 Sustainability and Emerging Technologies (3 credits)
- TADT 4873 Emphasis Related Capstone (3 credits)
- TADT 4878 Quality Assurance (3 credits)

COMPLETE THE FOLLOWING COURSE FOR 1 CREDIT:

- TADT 3970 Internship (1-3 credits)

COMPLETE THE FOLLOWING COURSE FOR 2 CREDITS:

- TADT 4970 Internship (1-12 credits)

II PROJECT MANAGEMENT CORE COURSES

COMPLETE THE FOLLOWING COURSES:

- ACCT 2101 Principles of Accounting I (3 credits)
- BUAD 2220 Legal Environment (3 credits)
- BUAD 2280 Computer Business Applications (3 credits)
- TADT 1460 2D Graphics And Laser Etching (3 credits)
- TADT 2877 Engineering Problem Solving (3 credits)
- TADT 3112 Leadership in a Team Environment (3 credits)
- TADT 3885 Technical Sales, Service and Training (3 credits)
- TADT 4875 Facilities Management (3 credits)
- TADT 4893 Applied Project Management (3 credits)

OPERATIONS MANAGEMENT EMPHASIS

COMPLETE THE FOLLOWING COURSES:

- TADT 1210 Introduction to Manufacturing Processes I (3 credits)
- TADT 1220 Introduction to Manufacturing Processes II (3 credits)
- TADT 2461 Parametric 3D Modeling (3 credits)
- TADT 3100 Principles of Professional Development (3 credits)
- TADT 3700 Operations Planning and Control (3 credits)
- TADT 3887 Safety and Risk Management (3 credits)
- TADT 4867 Lean Principles and Practices (3 credits)
- TADT 4879 Service Process/Improvement (3 credits)
- TADT 4880 Total Quality Management (3 credits)

SUGGESTED SEMESTER SCHEDULE PROJECT MANAGEMENT, B.S. OPERATIONS MANAGEMENT EMPHASIS

Freshman

- ACCT 2101 Principles of Accounting I (3 credits)
- BUAD 2280 Computer Business Applications (3 credits)
- TADT 1111 Introduction to Project Management (3 credits)
- TADT 1460 2D Graphics And Laser Etching (3 credits)
- TADT 1210 Introduction to Manufacturing Processes I (3 credits)
- TADT 1220 Introduction to Manufacturing Processes II (3 credits)
- Liberal Education Requirements

Sophomore

- BUAD 2220 Legal Environment (3 credits)
- TADT 2461 Parametric 3D Modeling (3 credits)
- TADT 2877 Engineering Problem Solving (3 credits)
- Liberal Education Requirements

Junior

- TADT 3100 Principles of Professional Development (3 credits)
- TADT 3112 Leadership in a Team Environment (3 credits)
- TADT 3267 Economic and Cost Analysis (3 credits)
- TADT 3700 Operations Planning and Control (3 credits)
- TADT 3885 Technical Sales, Service and Training (3 credits)
- TADT 3887 Safety and Risk Management (3 credits)
- Elective 01
- Elective 02
- Liberal Education Requirements

Senior

- TADT 4385 Sustainability and Emerging Technologies (3 credits)
- TADT 4867 Lean Principles and Practices (3 credits)
- TADT 4873 Emphasis Related Capstone (3 credits)
- TADT 4875 Facilities Management (3 credits)
- TADT 4878 Quality Assurance (3 credits)
- TADT 4879 Service Process/Improvement (3 credits)
- TADT 4880 Total Quality Management (3 credits)
- TADT 4893 Applied Project Management (3 credits)

Project Management, B.S. *major*
Construction and Facility Management Emphasis

Required Credits: 72
Required GPA: 2.25

I TADT COMMON CORE

COMPLETE THE FOLLOWING COURSES:

- TADT 1111 Introduction to Project Management (3 credits)
- TADT 3267 Economic and Cost Analysis (3 credits)
- TADT 4385 Sustainability and Emerging Technologies (3 credits)
- TADT 4873 Emphasis Related Capstone (3 credits)
- TADT 4878 Quality Assurance (3 credits)

COMPLETE THE FOLLOWING COURSE FOR 1 CREDIT:

- TADT 3970 Internship (1-3 credits)

COMPLETE THE FOLLOWING COURSE FOR 2 CREDITS:

- TADT 4970 Internship (1-12 credits)

II PROJECT MANAGEMENT CORE COURSES

COMPLETE THE FOLLOWING COURSES:

- ACCT 2101 Principles of Accounting I (3 credits)
- BUAD 2220 Legal Environment (3 credits)
- BUAD 2280 Computer Business Applications (3 credits)
- TADT 1460 2D Graphics And Laser Etching (3 credits)
- TADT 2877 Engineering Problem Solving (3 credits)
- TADT 3112 Leadership in a Team Environment (3 credits)
- TADT 3885 Technical Sales, Service and Training (3 credits)
- TADT 4875 Facilities Management (3 credits)
- TADT 4893 Applied Project Management (3 credits)

CONSTRUCTION AND FACILITY MANAGEMENT EMPHASIS

COMPLETE THE FOLLOWING COURSES:

- BUAD 3677 Real Estate (3 credits)
- TADT 1210 Introduction to Manufacturing Processes I (3 credits)

- TADT 1220 Introduction to Manufacturing Processes II (3 credits)
- TADT 2250 Built Environment (3 credits)
- TADT 2252 Construction Materials and Methods (3 credits)
- TADT 3250 Print Reading and Project Documentation (3 credits)
- TADT 3260 Project Bidding and Estimating (3 credits)
- TADT 3887 Safety and Risk Management (3 credits)
- TADT 4259 Construction Management (3 credits)

Design *minor*

Required Credits: 24
Required GPA: 2.00

I REQUIRED COURSES

COMPLETE THE FOLLOWING COURSES:
These courses must be completed before taking the courses below.

- TADD 1440 Drawing Foundations (4 credits)
- TADD 2440 2D Design Software (4 credits)
- TADD 3440 3D Design Software (4 credits)

II REQUIRED ELECTIVES

SELECT 3 OF THE FOLLOWING COURSES:

- TADD 3548 Advanced 3D Design (4 credits)
- TADD 3549 Interactive Design (4 credits)
- TADD 3568 Exhibit Design/Trade Show (4 credits)
- TADD 3569 Exhibit Design/Environments (4 credits)
- TADD 3578 Typography (4 credits)
- TADD 3579 Branding and Packaging (4 credits)
- TADD 4549 Advanced Media Design (4 credits)
- TADD 4569 Advanced Exhibit Design (4 credits)
- TADD 4579 Advanced Graphic Design (4 credits)

Engineering Technology *minor*

Required Credits: 18
Required GPA: 2.00

COMPLETE THE FOLLOWING COURSES 15 credits must be unique from major:

- TADT 1210 Introduction to Manufacturing Processes I (3 credits)
- TADT 1220 Introduction to Manufacturing Processes II (3 credits)
- TADT 1450 Introduction to Product Development (3 credits)
- TADT 1460 2D Graphics And Laser Etching (3 credits)
- TADT 3267 Economic and Cost Analysis (3 credits)
- TADT 3537 Industrial Design/Innovation (3 credits)

Project Management *minor*

Required Credits: 18
Required GPA: 2.00

SELECT 1 OF THE FOLLOWING:

- TADT 1111 Introduction to Project Management (3 credits)
- TADT 3111 Project Management Methodology (3 credits)

COMPLETE THE FOLLOWING COURSES:

- TADT 3112 Leadership in a Team Environment (3 credits)
- TADT 3267 Economic and Cost Analysis (3 credits)
- TADT 3885 Technical Sales, Service and Training (3 credits)
- TADT 4878 Quality Assurance (3 credits)
- TADT 4893 Applied Project Management (3 credits)
  (Note: TADT 4893 only offered on-campus)

Studio Arts *minor*

Required Credits: 24
Required GPA: 2.00

I REQUIRED COURSES

COMPLETE THE FOLLOWING COURSES:
These courses must be completed before taking the courses below.

- TADD 1440 Drawing Foundations (4 credits)
- TADD 2440 2D Design Software (4 credits)
- TADD 3450 History of Modern Design (4 credits)

II REQUIRED ELECTIVES

SELECT 3 OF THE FOLLOWING COURSES:

- TADD 1460 Introduction to Digital Photography (4 credits)
- TADD 2317 Painting: Watercolor (4 credits)
- TADD 3648 Color Theory (4 credits)
- TADD 3658 Drawing: Figure (4 credits)
- TADD 3659 Drawing: Still Life (4 credits)
- TADD 3748 Ceramics/Hand Building (4 credits)
- TADD 3749 Ceramics/Wheel (4 credits)
- TADD 4649 Advanced Painting (4 credits)
- TADD 4659 Art History (4 credits)

Lean Six Sigma *cert*

Required Credits: 30
Required GPA: 2.00

I REQUIRED COURSES

COMPLETE THE FOLLOWING COURSES:

- TADT 3111 Project Management Methodology (3 credits)
- TADT 3112 Leadership in a Team Environment (3 credits)
- TADT 3267 Economic and Cost Analysis (3 credits)
- TADT 3700 Operations Planning and Control (3 credits)
- TADT 3887 Safety and Risk Management (3 credits)
- TADT 4867 Lean Principles and Practices (3 credits)
- TADT 4873 Emphasis Related Capstone (3 credits)
- TADT 4878 Quality Assurance (3 credits)
- TADT 4879 Service Process/Improvement (3 credits)
- TADT 4880 Total Quality Management (3 credits)

II GRADUATION REQUIREMENTS You must pass the Lean Six Sigma (LSS) certification exam that is administered by the Association of Technology Management & Applied Engineering (ATMAE) with green belt level. The ATMAE Lean Six Sigma (LSS)certification exam covers 12 main content areas and is further divided into 88 subcategories. The exam is divided into two main parts: the first part consists of 100 multiple choice questions that are worth one point each. The second part of the exam is composed of 25 multiple choice questions that require an examinee to solve a production or statistical problem that may take several minutes.

Technology Manager *cert*

Required Credits: 15
Required GPA: 2.00

I REQUIRED COURSES

COMPLETE THE FOLLOWING COURSES:

- TADT 3111 Project Management Methodology (3 credits)
- TADT 3112 Leadership in a Team Environment (3 credits)
- TADT 3700 Operations Planning and Control (3 credits)
- TADT 3887 Safety and Risk Management (3 credits)
- TADT 4878 Quality Assurance (3 credits)

II GRADUATION REQUIREMENTS You must pass the Certified Technology Manager (CTM) exam that is adminstered by the Association of Technology Management & Applied Engineering (ATMAE). The Certified Technology Manager (CTM) exam is a multiple choice examination with questions on Leadership/Self-Management, Systems, Processes, Operations, People, Project, Quality and Risk.

Technology, Art and Design - Design Courses

TADD 1430 Design Foundations (4 credits)
This course introduces students to fundamental concepts and application of both two and three-dimensional design. Students gain an understanding of the principles of design, the design process, and design as a profession.

TADD 1440 Drawing Foundations (4 credits)
Two-dimensional visual design and problem solving through introductory drawing experiences. An introduction to the various methods and techniques along with use of materials and understanding of the elements of design and drawing. Students gain a psychological understanding of the connection between humans and nature and the influence of natural forms in the creative process. Liberal Education Goal Area 6.

TADD 1460 Introduction to Digital Photography (4 credits)
This course will explore digital photography and imaging techniques with special application to art and communication, with an emphasis on the principles of photography.

TADD 2317 Painting: Watercolor (4 credits)
Gives students a basic foundation in painting. Students investigate basic materials, techniques, and form and content as applied to painting. Liberal Education Goal Area 6.

TADD 2319 Painting: Oil (4 credits)
Further develops students' understanding of painting. Students investigate use of materials, techniques, form, and content as applied to painting.

TADD 2440 2D Design Software (4 credits)
An introduction to 2D digital techniques used to create and edit bitmap, vector, and metafile graphic images for various print and digital outputs. Students gain experience in the ideation and critical thinking process used to design and analyze imagery.

TADD 2517 Printmaking: Relief (4 credits)
This course will introduce students to basic concepts involving relief printmaking techniques and aesthetic issues within traditional printmaking practices. Students will explore the hand processes of relief printmaking: woodcut, linoleum block, monotype, solar etching and collagraph. Slide lectures, videos, critiques, demonstrations, discussions and reflective writing will support farther development of students skills, along with learning how to evaluate visual art within historical and contemporary context.

TADD 2519 Printmaking: Silkscreen/Intaglio (4 credits)
This course will explore the screen printing process, from image preparation to actual textile and paper printing. Students will create designs, prepare screens and burn screens, and print on several types of media.

TADD 2925 People of the Environment: Technology, Art, and Design Perspective (3 credits)
Discussion and evaluation of current environmental topics related to technology, art, and design. Liberal Education Goal Area 10.

TADD 2931 Experimental Course (4 credits)
A course proposed for inclusion in the University curriculum. May not be offered more than two times as an experimental course.

TADD 3251 Watercolor/Aqueous Media (3 credits)
Concentration on the study of composition, color and light, leading to an understanding of watercolor and/or acrylics. Prerequisite: VSAR 2250 or consent of instructor.

TADD 3420 Introduction to Exhibit Design (4 credits)
This course is an introduction to exhibit design. Emphasis is on the inventiveness of creating immersive experiences. Students will gain experience in the ideation, creativity, and critical thinking process. This course will apply the design process, color, lighting, space planning, materials, furnishings, details, computer software, and other technologies specific to the field of exhibit design.

TADD 3430 Introduction to Graphic Design (4 credits)
This course is an introduction and overview of the graphic design profession. Through lecture, demonstration, research and studio experience, students become familiar with the conceptual and visual processes of the working graphic designer. Prerequisites: TADD 1430, TADD 1440.

TADD 3440 3D Design Software (4 credits)
A comprehensive study of 3D computer modeling and rendering as it relates to spatial definition and form in exhibition design.

TADD 3450 History of Modern Design (4 credits)
An advanced level survey of major movements and tendencies, and key figures in the development of graphic, craft, and industrial design between the mid-nineteenth century and the present day. Liberal Education Goal Area 6.

TADD 3548 Advanced 3D Design (4 credits)
Includes topics on advanced 3D modeling and digital-video editing techniques. Focuses on 3D modeling, materials, lighting, and rendering. In combination with the 3D elements, also includes topics on video production, menu design, and video delivery methods. Prerequisites: TADD 1440, TADD 2440, TADD 3440, or consent of instructor.

TADD 3549 Interactive Design (4 credits)
Focuses on digital media development tailored towards interactive design. Includes topics on digital-signage, web design, animation, and application development. Prerequisites: TADD 1440, TADD 2440, TADD 3440, or consent of instructor.

TADD 3568 Exhibit Design/Trade Show (4 credits)
Focused study of the essential components of exhibition design as they relate to designing for the trade show industry. Engages the exhibit designer in project proposal and design of trade show booths of various types and sizes. Includes concepts relating to "green," modular/portable booths, fabric design solutions, and designing from an RFP. Prerequisites: TADD 1440, TADD 2440, TADD 3440, or consent of instructor; Corequisite: May be taken concurrently with TADD 3440.

TADD 3569 Exhibit Design/Environments (4 credits)
Focused study of the essential components of the exhibition design industry as they relate to designing for three-dimensional environments such as corporate lobbies, educational/museum exhibits, outdoor installations/museums, visitor centers, etc. Prerequisites: TADD 1440, TADD 2440, TADD 3440, or consent of instructor; Corequisite: May be taken concurrently with TADD 3440.

TADD 3578 Typography (4 credits)
A theoretical and practical study of the visual nature and expressive potential of digital type forms as a fundamental tool of the graphic designer. Students also practice digital print production that includes preparation of all digital typographic and/or graphic assets, and digital layout assembly to create single, spot, and process color documents. Prerequisites: TADD 2440 or consent of instructor.

TADD 3579 Branding and Packaging (4 credits)
A theoretical and practical study of the visual and conceptual problems related to branding and packaging. Students also practice digital print production management techniques for all digital assets, and digital layout assembly to create 3D package design, visual identity systems, and related marketing materials. Prerequisites: TADD 2440 or consent of instructor.

TADD 3648 Color Theory (4 credits)
Addresses basic principles of color theories and applications of color in drawing, painting, and design. Using a variety of materials, tools, and techniques, students work on projects that demonstrate concepts such as color mixing, color interaction, color space, color emphasis, and color emotion. Prerequisites: TADD 1440 or consent of instructor. Liberal Education Goal Area 6.

TADD 3658 Drawing: Figure (4 credits)
A continued study and application of design elements and principles with a focus on expressive drawing. Drawing materials, papers, and techniques are explored, with an increased use of color. Prerequisites: TADD 1440, or consent of instructor.

TADD 3659 Drawing: Still Life (4 credits)
Expanded instruction in drawing the human figure. This course allows the student to expand his/her knowledge and technical fluency on an individual basis, and encourages personal expression and development. Prerequisites: TADD 1440, or consent of instructor.

TADD 3748 Ceramics/Hand Building (4 credits)
The study and application of hand building for 3-dimensional visual design and problem solving that is integrated with the introduction to basic forming methods, glazing and firing of ceramic forms. Liberal Education Goal Area 6.

TADD 3749 Ceramics/Wheel (4 credits)
Three-dimensional visual design and problem solving is integrated with an introduction to potters wheel forming methods, glazing, and firing of ceramic forms. Liberal Education Goal Area 6.

TADD 3900 Junior Culmination (2 credits)
This course is designed to prepare design students for employment in the design industry. Topics include resume creation, goal setting, self-promotion and interviewing techniques. Students will also gain an understanding of personnel management issues, leadership and management styles, basic business principles and models. Prerequisites: Junior level status and consent of instructor.

TADD 4450 Studio Arts Senior Culmination (4 credits)
An examination and application of the functions and means of developing a well-designed art exhibition, culminating in an on-campus individual or group exhibition of an Art and Design major's personal art work. Thesis projects may culminate in research or experiential activities.

TADD 4549 Advanced Media Design (4 credits)
Focuses on combining several digital media elements. Combines 3D modeling, video-production, audio-production, and interactive delivery methods in order to produce advanced digital media content. Prerequisites: TADD 3548, TADD 3549, or consent of instructor.

TADD 4569 Advanced Exhibit Design (4 credits)
Advanced application of exhibit industry design concepts. Includes custom booths, exhibit construction systems, and flexible modular/portable designs. Students are also engaged in various aspects of project management, cost estimation, and budgeting. Prerequisites: TADD 3568, TADD 3569, or consent of instructor.

TADD 4579 Advanced Graphic Design (4 credits)
An advanced study of graphic design and its application in solving practical and complex visual problems. Prerequisites: TADD 3578, TADD 3579, or consent of instructor.

TADD 4630 Topics in Design (2-4 credits)
Research, advanced exploration, and/or applied study of various topics related to design.

TADD 4649 Advanced Painting (4 credits)
Further develops students' understanding of painting. Students investigate use of materials, techniques, form, and content as applied to painting. Prerequisites: TADD 3649 or consent of instructor.

TADD 4659 Art History (4 credits)
Through lectures, readings, gallery visits, and hands-on activities, students develop an understanding of the elements and principles of art, a basic vocabulary for describing visual art, a general understanding of the role art has played throughout history, and contemporary trends.

TADD 4808 Special Readings (2 credits)
Reading assignments related to studio research. Prerequisite: Consent of instructor.

TADD 4900 Senior Culmination (2 credits)
This course will focus on the preparation and presentation of a professional portfolio. Prerequisites: TADD 3900 and 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

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