Preface

The Department of Civil and Environmental Engineering houses programs in Civil Engineering and in Environmental Engineering.

**Civil engineers** plan, design, build, and manage the facilities that are essential to our civilization - bridges, dams, highways, transit systems, airports, tunnels, irrigation systems, water distribution and wastewater treatment facilities, and industrial and commercial buildings. Civil engineers must meet the challenges of the deteriorating infrastructure, traffic congestion, energy needs, natural and human-induced hazards, urban redevelopment, sustainability, pollution control, and community planning. They manage and guide technological advances necessary for human health and well-being and the protection of earth's ecosystems. The planning, design and construction of large, one-of-a-kind systems and structures is a hallmark of civil engineering. Civil engineers are involved in planning, design, or managing of a variety of projects. Assignments might place them at a computer workstation, in front of a public hearing, or on a project work site -- at the forefront of technology.

**Environmental engineers** may be involved in work on local, regional, or global scales. Environmental engineers plan, design, build, and manage processes and human infrastructure with the overarching objective to provide cost-effective solutions to maintain public health and sustainable ecosystems. Environmental engineers account for balances of mass and energy within and transfers across system boundaries, including human infrastructure boundaries (e.g., building walls), natural boundaries (e.g., watersheds), and combinations of these. Environmental engineers work to ensure that air, water, and soil/sediment are adequately clean for various beneficial purposes. They design, test, and build appropriate technology to eliminate, minimize, treat, and prevent undesired migration of wastes; they develop and implement policies for pollution control and remediation of contaminated air, water, and land resources; and they work in industry to meet the “triple bottom line” of social, economic, and environmental sustainability.

**Future**

The complexity of future projects calls for a change in the way that civil and environmental engineers are trained. The current four-year baccalaureate degree is inadequate for the practice of civil and environmental engineering in the 21st century. Future civil and environmental engineers will require additional training in business, leadership, management, and public policy. It is likely that professional registration will
require both a bachelor’s and a master’s degree or its equivalent. Civil and environmental engineering projects will be more global in nature, and the tenets of sustainability (environmental, economic, and social) will need to be addressed in these engineering designs.

**Civil Engineering**

The future of civil engineering will require a sustainable use of resources in the environment and the infrastructure. Structures (buildings, bridges, highway pavements, etc.) will have embedded sensors or smart materials that allow them to adjust to changing environments and conditions. The development and use of new and recycled materials will be essential to the long-term durability of civil engineering infrastructure. Analyzing the behavior of human interactions with the infrastructure will become vital in building and transportation systems, security, water resources, energy use, and construction.

**Environmental Engineering**

Some of the important problems of the next few decades will include population growth and declining resources, adaptation to climate change, reduction of greenhouse gas emissions, public health (especially in developing countries), rapid urbanization and the provision of water and waste management, and global air pollution. Multi-disciplinary solutions will be required. Environmental engineers must be prepared not only to react to changes in climate and resource availability, but also to help manage that change through sustainable engineering.

**Undergraduate Educational Goals & Objectives**

Michigan Tech civil and environmental engineering baccalaureate graduates are educated to begin professional careers that apply a broad base of engineering, science, and communication skills to a variety of civil and environmental engineering endeavors and to develop advanced competence in a few specialties. Thus, we expect that during the first several years following graduation, our graduates will:

1. Function as productive members of the profession and society with an understanding of the social, ethical, environmental, economic, and global ramifications of their work as demonstrated by some of the following:
   - Membership in professional organizations
   - Community service
   - Evidence of commitment to life-long learning

2. Successfully apply their knowledge and skills to engineering practice or to advanced education as demonstrated by some of the following:
   - Entry level professional employment or full-time graduate school
• Conception, planning, design, management, construction, or operation of civil or environmental engineering projects
• Successful advancement in position classification
• Achievement of professional licensure
• Earning graduate degrees and/or other professional certificates

Mission

The Department of Civil and Environmental Engineering provides an educational, professional, and intellectual experience that enables students, alumni, faculty, and staff to contribute to society through teaching, research, practice, and service.

Vision

The Department of Civil and Environmental Engineering will develop internationally prominent educational and research programs that will benefit all of our constituencies and, in doing so, we will become an international Department of Choice.

Strategic Goals

Goal 1: Develop internationally prominent PhD programs

Objectives
- 3 journal publications per PhD student
- 10% of graduates in high impact positions
- 10 PhD graduates/year

Goal 2: Enhance our masters programs including a strong Masters International program, research masters degrees, and professional masters degrees.

Objectives
- 40 Masters graduates per year
- 1 journal or conference publication per Plan A or B student

Goal 3: Maintain and improve our nationally recognized bachelors programs

Objectives
- 20 largest BS programs
- benchmarked leadership documented (One of the top BSCE and BSEnE programs in the United States)
- average composite ACT > 27; average class rank > 80th percentile
- 30% of BSCE graduates women
- 50% of BSEnE graduates women
- 50% of CEE graduates participate in an international experience
100% of BS graduates have a professional work experience through an internship, coop, research, or other employment

**Goal 4: Increase national and international visibility through enhanced faculty accomplishments**

**Objectives**
- 3 journal publications per year per faculty
- All eligible faculty apply for CAREER awards 3 times or until awarded
- 20% faculty with high-visibility professional service
- 25% faculty fellows
- 10% faculty holding prominent medals or awards
- NAE or NAS member by 2015

**Goal 5: Encourage all faculty and staff to reach their potential**

**Objectives**
- A Charter that helps the Department reach its strategic goals
- A workload allocation scheme that allows faculty to make the best use of their strengths and assists the Department in reaching its strategic goals
- A reward system that is based on an individual’s accomplishments and is connected to the strategic goals
- Quality mentoring and regular feedback on an individual’s progress

**Goal 6: Enhance alumni relations**

**Objectives**
- 1 alumni/faculty off-campus gathering per year
- At least 1 alumni article or profile in each newsletter
- 25% of alumni give gifts annually

**Goal 7: Develop external relationships**

**Objectives**
- 1 industry, government, or non-profit organization partnership created annually
- 10% of faculty serve on corporate boards, non-profit boards, or government advisory panels
- 20% of faculty consult with industry or government