

## Departmental Base Budget Overview

Department **Engineering Accreditation**

Executive **Provost**

Index **414003**

Program **01**

**Base Budgets:**

1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	10-Year % Change
317,094	298,390	281,365	262,572	265,342	255,518	339,396	255,518	265,557	395,398	347,151	9.48%

**College Mission Statement:** The College of Engineering will serve the State of Montana and the nation by: Supporting student achievement; Integrating learning and discovery; and Developing and sharing technical expertise.

**Overview:** Engineering Accreditation (a.k.a. Program Modification) monies were authorized by the state legislature in the early 1990's to help offset the considerably higher per student costs related to ABET accredited programs (mandated for professional employment and licensure). These costs include faculty/staff time required to manage the assessment process associated with accreditation, as well as costs associated with maintaining modern teaching labs (also a significant accreditation requirement), much of which cannot be augmented by research equipment.

**Relation to University:** Maintaining professional accreditation for engineering and computer science programs is arguably the most vital on-going function performed by our faculty as it reflects all aspects of the relevance and quality of our undergraduate offerings. Failure to meet accreditation standards would have serious effects upon the College. For example, our students would no longer be eligible for professional licensure in most states which would have an immediate and devastating impact upon recruitment and enrollment. In addition, several sources of federal funding would be at risk including student loans and faculty education initiatives.

**Measures of Quality:** All engineering and engineering technology programs have been re-accredited during respective site visits in 2002 and 2003. The Computer Science program underwent a re-accreditation self-study and site visit in the Fall of 2004, plus an additional follow-up site visit in the Fall of 2006.

## Departmental Base Budget Overview

Department **Chemical Engineering**

Executive **Provost**

Index **414100**

Program **01**

### Base Budgets:

1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	10-Year % Change
470,873	494,087	491,109	527,816	545,777	545,127	584,052	591,965	594,904	615,440	651,889	38.44%

The **Chemical and Biological Engineering Department** is facing new stresses as we continue to build our research component even as enrollments in our undergraduate program are increasing. Our new faculty members are continuing our commitment to quality education while building strong research programs. External research funding is growing but facility limitations are being felt more and more, and traditionally high teaching loads are in danger of going higher as increased enrollments force us to consider additional sections.

The Department contributes to the University's mission by providing the following degrees:

- BS/MS/PhD – Chemical Engineering
- MS/PhD – Environmental Engineering (with Civil Eng.)

The Department contributes to cross-disciplinary research through the Center for Biofilm Engineering, the Thermal Biology Institute, the multi-disciplinary Environmental Engineering program, Fuel Cell program, and Wind Energy program.

### Quality/Productivity

Our **faculty** is committed to educational excellence and quality research. Our nine tenure-track faculty members have accumulated numerous teaching awards ranging from Mortar Board Professor of the Month awards to the President's Excellence in Teaching Award (Deibert, 2002), and a regional ASEE award. In research, our faculty have received 3 NSF Career Awards, 1 Cox and 3 Wiley Research awards, and a recent Murdoch Foundation award.

We have excellent **students**. Over half of our 2006 graduating class graduated with honors or high honors. Many ChBE students (25 in AY05) participate in undergraduate research, and in recent years ChBE students have received the following fellowships: 3 Goldwaters, 1 Whitaker, 3 INRA, 2 BRIN and 1 NSF. Starting salaries for many of our BS graduates are exceeding 60K/year.

Our **productivity** is high. Over the last 5 years ChBE has enrolled approx. 3½ graduate students per tenure track faculty member, which compares well with the physical / biological science programs on campus. Our graduate program has been transitioning towards a predominantly PhD emphasis, with the majority of our graduate students now PhD candidates. Department personnel in the last two years published over 25 reviewed research articles and new editions of two texts used by engineering programs across the country.

Our **graduates** continue to play leading technical and managerial roles in Montana as well as across the nation.

## Departmental Base Budget Overview

Department **Civil Engineering**

Executive **Provost**

Index **414200**

Program **01**

### Base Budgets:

1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	10-Year % Change
1,082,135	1,136,163	1,157,715	1,253,668	1,306,666	1,319,128	1,359,612	1,432,479	1,440,928	1,489,407	1,612,540	49.01%

Our *Mission Statement* is two-fold:

- Foremost, we will provide undergraduate education founded on a rigorous treatment of engineering fundamentals coupled with modern engineering tools. We see competency in mathematics, physical science, and engineering mechanics, as crucial to our mission.
- Provide graduate education opportunities in a majority of traditional civil engineering areas. The department will maintain sufficient breadth to provide post-baccalaureate education focused on professional practice. The department will provide graduate opportunities in a subset of focus areas coupled to vibrant research programs with sound external funding.

More than 600 students are currently earning degrees awarded by the Civil Engineering department. Approximately one out of every three engineering students, and one out of every 20 MSU students is a major in the CE department. FY 2005 Delaware Study data indicates that the department is one of the most efficient (or most under-funded) departments at MSU, with instructional expenditures per student credit hour being only 61% of the study average for research universities. The department administers the 12 credit-hour course sequence in engineering mechanics (EM). Most of MSU's engineering students are required to take the EM sequence, a service that the department provides to the College of Engineering. The largest demand for engineers in Montana is in the Civil and Construction ranks. Approximately 250 Montana engineers attend the CE department hosted annual Spring Engineering Festival. Department faculty members are also extensively involved in other outreach activities. Both the Center for Biofilm Engineering (CBE) and the Western Transportation Institute (WTI) were born in the Civil Engineering department and department faculty members are integrally involved in the activities of these centers. FY 2005 Delaware Study data indicates that annual research expenditures of the department's faculty were \$3,490,848 (\$205,344 per FTE T/TT faculty x 17.0 FTE T/TT faculty). Many of these expenditures were by faculty members working collaboratively with the CBE and WTI. Measured in contributions to economic development and infrastructure, engineering talent production, research, or outreach, the department is central the University mission.

The department has benefited from two significant base budget adjustments since the 1996-1997 AY.

1. 1996-1997 base adjustment - \$30,000 – partial salary for additional Construction Engineering Technology (CET) faculty member to support the development of the Master of Construction Engineering Management (MCEM) degree.
2. 2002-2003 base adjustment - \$59,500 – salary for additional Transportation Engineering faculty member to support growing educational and research program in Transportation Engineering.

## Departmental Base Budget Overview

Department **Electrical Engineering**

Executive **Provost**

Index **414300**

Program **01**

### Base Budgets:

1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	10-Year % Change
1,011,284	1,058,869	1,030,269	1,087,639	1,034,034	999,878	1,056,341	1,068,438	1,073,805	1,109,336	1,193,356	18.00%

**Purpose** The Department of Electrical and Computer Engineering serves MSU and the State of Montana by providing academic programs leading to ABET-accredited Bachelor of Science degrees in Electrical Engineering (EE) and in Computer Engineering (CpE), a Master of Science degree in Electrical Engineering, and a Ph.D. with an option in Electrical and Computer Engineering.

**Productivity** The ECE Department serves nearly 300 majors, including about 40 graduate students involved with the research program. ECE research expenditures in FY06 were \$2.4M, which involved nearly every ECE faculty member. In the past year, ECE awarded 2 PhD degrees, 12 MSEE degrees, and 37 BS degrees. The 13 T/TT ECE faculty produced 48 professional publications during the past year and submitted 40 proposals seeking new research funding.

In 2006, Dr. Steve Shaw received a prestigious 5-year NSF CAREER award; Dr. Jim Becker also received a similar NSF CAREER award two years ago. The Montana Microfabrication Facility (clean room), under the leadership of Dr. David Dickensheets, is being used by MSU researchers and private companies, and two new classes (senior and graduate level) have recently been initiated that use this unique facility. Construction is underway for the second phase of the MMF facility; completion is planned for next fall.

Dr. Richard Wolff, holder of the fully-endowed Gilhousen Communications Chair in ECE, is making great strides developing the telecommunications program, including leveraging with new private and public research grants, such as recent awards from NSF and the Montana Research and Commercialization Board. Under Dr. Wolff's guidance, the telecommunications program is actively engaged with the Western Transportation Institute on wireless technologies. Dr. Wolff is also leading the strategic planning activities for campus IT services.

**Challenges and Opportunities** (a) With the high research productivity, additional quality research space is a critical issue that is causing limitations on future growth. (b) Salary compression is a major problem, compounded by nationally competitive starting salaries. (c) To accommodate the increasing workload of the growing research program, ECE is seeking to hire two new faculty for FY08. Funding for one is in place; for the other, funding has been requested including bridging ideas. (d) In response to ECE documented needs for 4 additional GTA lines, 2 additional GTA lines were added for FY07. The need remains high for the remainder of the requested GTA positions to help with the over 30 ECE undergraduate laboratory sections and to help grow the research program. (e) By leveraging several sources, including annually seeking external opportunities, ECE UG laboratories are being kept up to date with modern instrumentation for educational use.

**Look to the Future** With enthusiastic, capable, and talented faculty in the Department, and anticipated new faculty hires for FY08, ECE is poised for excellence in both undergraduate and graduate/research programs that are producing strong contributions to the goals of MSU.

## Departmental Base Budget Overview

Department **Industrial & Management Engineering**

Executive **Provost**

Index **414400**

Program **01**

### Base Budgets:

1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	10-Year % Change
446,791	463,259	471,552	504,214	497,895	539,949	543,142	549,994	553,543	575,030	593,643	32.87%

The 414400 account serves the Industrial Engineering (IE) program in the Mechanical & Industrial Engineering (M&IE) Department. The mission of the Industrial Engineering program is to produce graduates with a foundation in both classical and current Industrial Engineering knowledge and skills consistent with the land-grant mission of MSU. Industrial Engineering is one of the basic engineering programs commonly found in any land-grant university.

The Department currently offers the Bachelor of Science degree in Industrial Engineering and the Masters of Science degree in Industrial and Management Engineering. Students may also obtain the Ph.D. in Engineering with Industrial Engineering Option from MSU. The IE program currently serves around 110 undergraduate students and approximately 15 graduate students. There are 6 tenure track faculty members involved in the IE program, including the Dean of the College of Engineering. Several adjunct faculty members currently support the program. The IE program is fully ABET (Accrediting Board for Engineering and Technology) accredited. The department has been making a focused effort to grow IE enrollments within a range of 125 to 150 undergraduate students and 30 graduate students. The program is currently searching for a new tenure-track faculty member to work synergistically with the Western Transportation Institute. The recent addition of the Industrial Engineering Option in the College of Engineering umbrella Ph.D. program has allowed, for the first time, IE Faculty to participate in Ph.D. education. Coupled with the Mechanical Engineering and Mechanical Engineering Technology programs that are also housed in the Mechanical & Industrial Engineering Department, M&IE makes up one of the largest departments in the University.

According to the Delaware study, the M&IE Department is one of the more efficient departments on campus. For example, Instructional expenditures per SCH for M&IE are below the MSU average. Our students continually score above the national average on the national Fundamentals of Engineering examination. Current research expenditures in M&IE are approaching \$1M annually. The department has continued to provide exceptional service with funding provided, and is well positioned for future research and economic development activities.

While our enrollments have increased in the recent past, the associated services required to meet our commitments have also increased but our operations budget has not changed significantly for a number of years. Our research expenditures are also increasing and these require additional support as well, particularly in physical space for research laboratories.

The IE program has excellent growth potential in the near term if adequate resources are provided by the University. The Department's capacity to add value to the state and nation is also significant.

## Departmental Base Budget Overview

Department **Mechanical Engineering**

Executive **Provost**

Index **414500**

Program **01**

**Base Budgets:**

1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	10-Year % Change
797,269	841,267	854,646	923,394	932,238	962,469	1,039,278	1,062,232	1,066,959	1,097,943	1,148,718	44.08%

The 414500 account includes the Mechanical Engineering (ME) and Mechanical Engineering Technology (MET) programs in the Mechanical & Industrial Engineering Department (M&IE). The Department currently offers the B.S. and M.S. degree in ME and the B.S. in MET. Students may also obtain the Ph.D. in Engineering with Mechanical Engineering Option. No graduate degrees are offered in the MET program. The ME program currently serves about 430 undergraduate students and approximately 20 graduate students. The Mechanical Engineering Technology program is one of the larger technology programs nation-wide, currently serving around 130 undergraduate students. Therefore, the 414500 base budget serves about 5% of the total university student population (given an overall university population of around 12,300 students). The ME and MET programs are fully ABET (Accrediting Board for Engineering and Technology) accredited. There are 15 tenure-track faculty members involved in the ME and MET programs including the Department Head (this includes 1 tenure-track faculty vacancy.) Several adjunct faculty members are currently required to support both programs. Coupled with the Industrial Engineering program that is also housed in the Department, the M&IE Department is one of the largest departments in the University.

According to the Delaware study, the M&IE Department is one of the more efficient departments on campus. For example, Instructional expenditures per SCH for M&IE are below the MSU average. Our students continually score above the national average on the national Fundamentals of Engineering examination. Current research expenditures in M&IE are approaching \$1M annually. The department has continued to provide exceptional service with funding provided, and is well positioned for future research and economic development activities.

However, both ME and MET are undergoing significant challenges, including faculty change. Four professors retired during the last 3 years. Other retirements are approaching. Three new tenure track faculty members have been hired in ME in addition to a new Department Head, and three new tenure-track faculty members have now been hired in the MET program. The workload of the retiring faculty was 100% instructional for several years, while the new tenure-track faculty members have been hired with research expectations and a reduced teaching load in order to be successfully tenured. Of course, we still have to meet the instructional offerings for our students. These changes put the department in a very challenging position, while at the same time presenting great opportunities for future development.

While our enrollments have increased in the recent past, the associated services required to meet our commitments have also increased but our operations budget has not changed significantly for a number of years. Our research expenditures are also increasing and these require additional support as well, particularly in physical space for research laboratories.

The ME and MET programs have excellent growth potential in the near term if adequate resources are provided by the University. The Department's capacity to add value to the state and nation is also significant.

## Departmental Base Budget Overview

Department **Computer Science**

Executive **Provost**

Index **414604**

Program **01**

**Base Budgets:**

1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	10-Year % Change
557,843	589,112	642,354	721,474	746,585	753,380	821,501	872,896	942,067	976,831	1,013,929	81.76%

**Role of the Computer Science Department:** To provide PhD, MS, and ABET-accredited BS degrees in CS, to teach service courses in computer literacy and programming, and to perform research.

**Enrollment:** Over the past twelve years the number of undergraduate majors in CS increased about 60%, then tapered off (the result of a temporary slowdown in high-tech industries) and the graduate program increased about 30%. Resources did not increase with enrollments, but with the appointment of a new Dean of Engineering in 2001, new commitments were made to CS in the form of a new department head (February 2003 - Oudshoorn) and a new faculty line. In addition, the department is hoping to replace a faculty line due to a recent retirement (August 2006 – Babcock). These hires will make it possible to grow both undergraduate and graduate student enrollments. PhD enrollments are growing at a steady rate at the moment. The department is well positioned to attract a significant number of international students.

**Research:** In spite of enrollment increases, departmental research has expanded. Several tenure-track faculty members are now PIs on competitive external grants with support from NSF (multiple grants), USGS, NASA/USDA, and Lockheed/INEEL, with collaborative projects ranging from computational biology to computer assisted education. Interdisciplinary research collaborations and research groups within computer science are flourishing and are likely to expand further with the new faculty hires.

**Industrial relations:** We are listed as a key school in CS by Micron (one of two Micron key schools in CS nationwide), HP VLSI Division, Extended Systems, and Tektronix. We receive significant scholarship support from companies including current annual donations of \$34,000 from Micron, RightNow Technologies, Zoot Enterprises and TeleSoft Partners. In addition, the department has just secured a gift of \$315,000 from RightNow Technologies to assist the department in hiring a high profile researcher.

**Student recognition:** Since 1992, CS majors have received four *USA Today* Academic All American Awards and five Goldwater Awards.

**Student placement:** There is a wide diversity in employers for CS graduates. Employers of our graduates span the country. PhD graduates are finding employment in tenure-track positions at other institutions such as Utah State University and Montana Tech, in addition to research positions in institutions such as the University of Alaska - Fairbanks.

**Budget note:** In 2004 the Computer Science Distance Learning account (414604) was rolled into this account. This accounts for the growth in budget from 2003 to 2004. A new faculty line was made available in 2005.

## Departmental Base Budget Overview

Department **Computer Science Distance Learning**

Executive **Provost**

Index **414605**

Program **01**

Base Budgets:

1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	10-Year % Change
0	33,000	32,930	33,699	24,797	36,919	37,725	0	0	0	0	

This budget was merged with 414604, the main Computer Science budget, effective July 1, 2003.

When this budget was created in 1997, it made sense to separately fund distance learning efforts: Distance learning was a new, time-intensive endeavor and was thus tackled as a distinctly separate thrust in the Department and funded through this separate budget (414605). Currently, Web-based courses are still a strength (notably in CS 301 and 302), but these efforts are now fully integrated with the curriculum and on-campus classes.

The result is that although the design and development of web-based, distance-learning resources is still a time-intensive effort, the administration of this effort is inextricably entwined with the administration of regular instructional efforts. The division of the budget between “regular” and “distance learning” components has become an artificial and unnecessary complication to the budgeting process.



## Departmental Base Budget Overview

Department **Aerospace Studies**

Executive **Provost**

Index **414800**

Program **01**

**Base Budgets:**

1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	10-Year % Change
22,259	22,758	22,054	23,726	27,616	27,768	28,999	30,532	30,839	32,046	26,636	19.66%

Mission Statement: "To recruit, educate, train, and commission quality Air Force officers, while fostering the tradition and spirit of excellence unique to Det 450 and Montana State University."

Aerospace Studies/AFROTC recruits quality students and maintains an average annual enrollment of approximately 84 cadets who provide Air Force Scholarship monies of approximately \$400K annually and an additional \$150K annually in monthly stipends that go directly to the student for living expenses.

This is a very small budget, and most of it is committed to a classified staff member's salary (which is determined by the MPEA contract). The operations budget is used for non-programmed, on-campus charges and supplies that cannot be billed to the Air Force. Variances in the overall budget are reflective of changes to the classified staff position over time (i.e., a position upgrade, hiring an individual with longevity, and annual raises).

## Departmental Base Budget Overview

Department **Military Science**

Executive **Provost**

Index **414900**

Program **01**

**Base Budgets:**

1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	10-Year % Change
20,895	20,895	20,983	22,882	23,706	23,801	24,742	27,828	28,179	29,329	30,464	45.80%

Army ROTC is a non-degree awarding instructional department that receives its organizational support from the College of Engineering. Our mission is “to commission the future officer leadership of the U. S. Army and motivate young people to be better citizens.” We achieve this mission through our classes--emphasizing leadership, management, decision-making and patriotism as well as the benefits of building physical fitness and character. Those emerging from Army ROTC not only have a college degree but a commission as a second lieutenant in the U.S. Army.

In the role of attracting and retaining quality students, the scholarship programs offered by Army ROTC are many. MSU is a member of the Army ROTC Partnership in Nursing Education program. MSU has a three or four-year scholarship allocation of 3 that can be awarded to students to become Army Nurses. Army ROTC’s “Green-to-Gold” program offers scholarships to soldiers that have completed 2 years of active Army service; these scholarships are limited only by the students seeking them. In addition to these, MSU Army ROTC has a three or four year scholarship allocation of 10 to award to incoming freshmen. We have a base number of scholarships each year but we can request an increase to that base for quality MSU students that apply. We work with the U.S. Army Reserves and the Montana Army National Guard seeking ways for students to get money for their college education at MSU. The scholarship and citizen-soldier opportunities provided by Army ROTC benefit the recruitment and retention of students to MSU. Through these scholarships and student benefits, along with faculty pay and allowances (Active Army professors, assistant professors and instructors) the Army invests between \$1.3 and \$1.7 million with the cost to the university being \$29,329 that the department is allocated for operations and salary.

MSU Army ROTC is ranked in the top 15% of all Army ROTC programs in the nation. In addition, two of MSU Army ROTC’s cadets were ranked in the top 10% of ROTC graduates nationwide.

Key performance indicators for Army ROTC for AY05 were:

Ranking of cadet’s nation wide through the accession process: Two cadets in the top 10% and 3 in the top 20% of the nation out of 4800.

Program retention rates: (this is whether or not a student remains in Army ROTC, it must be remembered that this program is not only academically selective but also physically selective. Students may not meet the physical qualifications to remain in the program.) Our retention rates are: Seniors 100%, juniors 85%, sophomores 85%, and freshmen 60%.

Meeting our commissioning goal: We have exceeded our commissioning goal of 13 for the last several years and are poised to commission 17 this year.