



# University of Colorado at Boulder

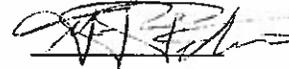
Office of the Chancellor

914 Broadway  
17 UCB  
University of Colorado, Boulder, CO 80309-0017  
303-492-8908  
Fax: 303-492-8866

**TO:** President Bruce D. Benson

  
Approved

**FROM:** Chancellor G. P. "Bud" Peterson



**DATE:** July 22, 2008

**SUBJECT:** Coordinated Bachelor of Science Degree in Mechanical Engineering

## I. REQUEST FOR ACTION BY THE BOARD OF REGENTS

With the concurrence of Provost Phil DiStefano and Dean Robert Davis, I recommend that the following resolution be submitted for approval by the Board of Regents on August 21, 2008.

RESOLVED that a coordinated Bachelor of Science degree in Mechanical Engineering be offered by the University of Colorado at Boulder (CU-Boulder) and Mesa State College (MSC) to students in residence at MSC, Grand Junction, Colorado. Upon board approval, this request will be transmitted to the Colorado Commission on Higher Education for approval.

## II. STATEMENT OF INFORMATION

MSC and CU-Boulder have entered into a collaborative partnership to deliver a mechanical engineering program in its entirety in Grand Junction. Students completing the program will be awarded a Bachelor of Science in Mechanical Engineering (BSME) degree from CU-Boulder.

It is expected that the MSC/CU-Boulder Mechanical Engineering Partnership Program will enable students to earn a BS degree in mechanical engineering that is fully accredited by ABET (Accreditation Board for Engineering and Technology). The complete four-year program is offered in residence at MSC in Grand Junction, CO. This is not a new degree; successful completion of the program requirements earns the student a BSME degree from CU-Boulder equivalent to that earned by a student on the Boulder campus. The first two years of classes, including supporting math, science, humanities, social sciences, writing, and basic engineering classes, are offered by MSC. Upper-level mechanical engineering classes are offered by CU-Boulder at MSC in Grand Junction.

The first cohort of freshmen is expected to start the program on the MSC campus in fall 2008. Beginning in fall 2010, CU-Boulder will offer, on the MSC campus, the upper-

division mechanical engineering courses necessary for students to fulfill their engineering degree requirements. The earliest that students will graduate from this program is spring 2012.

The BSME degree prepares students for careers in a wide range of industries through the rigorous study of mechanical engineering. Students participate in hands-on engineering design projects beginning in their freshman year and continuing through senior design projects. Residence at MSC provides mechanical engineering students the unique option of small class size and more contact with faculty while experiencing an engineering program equal in quality to that delivered on the CU-Boulder campus.

Financial commitments from the Office of the President, the College of Engineering and Applied Science, and the Office of the Provost will provide support to the program, in addition to tuition, fees, gift funds, and college-opportunity-fund revenue.

This item will be reviewed and discussed at the August 20, 2008, Academic Affairs Committee meeting.

### **III. PREVIOUS ACTION**

None.



University of Colorado at Boulder

Office of the Provost and Executive Vice Chancellor for Academic Affairs

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360 Regent Administrative Center  
40 UCB  
Boulder, CO 80309-0040  
303-492-5537; 303-492-8861(Fax)

July 21, 2008

TO: G.P. "Bud" Peterson  
Chancellor, University of Colorado at Boulder

FROM: Phil DiStefano   
Provost & Executive Vice Chancellor

RE: CU-Boulder/Mesa State Coordinated Degree

I have reviewed the proposal for a coordinated degree in mechanical engineering and recommend your approval. This partnership program between CU-Boulder and Mesa State will enable students to earn a BS Degree in mechanical engineering that is fully accredited by the Accreditation Board for Engineering and Technology (ABET). The first cohort of freshmen is expected to start the program on the Mesa State campus, beginning in fall 2008. CU-Boulder will offer the upper division mechanical engineering courses necessary for students to fulfill their engineering degree requirements beginning Fall 2010.

Please let me know if you have any questions about this proposal.



**Mesa State College & University of Colorado at Boulder  
Proposal for a Coordinated Degree in Mechanical Engineering**

July 2008

Prepared for:  
University of Colorado Board of Regents  
Colorado Commission on Higher Education

**A.1. Description of Program**

Mesa State College and the University of Colorado at Boulder propose a partnership to deliver a mechanical engineering program in its entirety in Grand Junction. Students completing the program will be awarded a Bachelor of Science in Mechanical Engineering degree from the University of Colorado at Boulder. The BS in Mechanical Engineering degree has been in place at CU-Boulder for over 100 years. Thus, we are not proposing a new degree but rather a new mode of offering an existing degree.

It is expected that the MSC/CU-Boulder Mechanical Engineering Partnership Program will enable students to earn a BS degree in mechanical engineering that is fully accredited by ABET (Accreditation Board for Engineering and Technology). This existing degree is already accredited by ABET through June 2012. However, an evaluation of the new mode and its location for this degree will be required by ABET near the time when the first students graduate from the coordinated program. The complete four-year program is offered in residence at Mesa State College (MSC) in Grand Junction, CO. Successful completion of the program requirements earns the student a Bachelor of Science in Mechanical Engineering (BSME) from the University of Colorado at Boulder (CU-Boulder) equivalent to that earned by a student on the Boulder Campus. The first two years of classes, including supporting math, science, humanities, social sciences, writing, and basic engineering classes are offered by Mesa State. Upper-level mechanical engineering classes are offered by CU-Boulder at MSC in Grand Junction, supplemented by elective courses offered by Mesa State.

The first cohort of freshmen is expected to start the program on the MSC campus in fall 2008. CU-Boulder will offer on the MSC campus, beginning in Fall 2010, the upper-division mechanical engineering courses necessary for students to fulfill their engineering degree requirements. The earliest that students will graduate from this program is Spring 2012. If a more advanced student is admitted into the program and seeks to graduate prior to this date (which would only occur under special circumstances on an individual basis), that student will be required to transfer to CU-Boulder for degree completion.

The BSME degree prepares students for careers in a wide range of industries through the rigorous study of mechanical engineering. Students participate in hands-on engineering design projects beginning in their freshman year and continuing through senior design

projects. Residence at Mesa State provides CU-Boulder engineering students the unique option of small class size and more contact with faculty while experiencing an engineering program equal in quality to that delivered on the CU-Boulder campus.

## **A.2. Program Learning Goals**

Student learning goals of this program coincide with the learning goals of mechanical engineering undergraduate students located at the CU-Boulder campus, which include the following overall objective and outcomes:

The educational objective of the undergraduate program in Mechanical Engineering is to prepare graduates so that, within three years of graduation, they will have successfully established themselves in professional careers and/or obtained a graduate degree, and will have begun to generate new knowledge or exercise leadership in their positions to the benefit of society.

The following Program Outcomes stem from the overall educational objective listed above. It is our intention that every graduate of the ME program possess the following measurable outcomes:

1. Ability to apply knowledge of mathematics, science, and engineering
2. Ability to identify, formulate, and solve engineering problems
3. Ability to use computers to solve engineering problems
4. Ability to use modern instrumentation
5. Ability to design and conduct experiments including the use of probability and statistics
6. Ability to analyze and interpret data
7. Ability to design thermal systems, components, or processes to meet desired needs
8. Ability to design mechanical systems, components, or processes to meet desired needs
9. Knowledge of the processes used to manufacture products
10. Knowledge of contemporary issues in mechanical engineering
11. Ability to make effective oral presentations
12. Ability to write effectively
13. Ability to function effectively on multi-disciplinary teams
14. Understanding of professional and ethical responsibility
15. Understanding of the impact of engineering in a global and societal context
16. Ability to engage in life-long learning

### **B.1.a. Bona Fide Need: Student Demand**

The target market for this Partnership Program is a Western-slope, college-bound student who may not be able to relocate to a distant institution to pursue an engineering degree (due to economic constraints, family/personal obligations, etc.). Annually, the College of Engineering and Applied Science at CU-Boulder receives an average of 75-100

baccalaureate applications from Colorado's Western-slope counties, indicating a desire of many western Colorado students to pursue engineering degrees.

Enrollment in the mechanical engineering program at the CU-Boulder campus is currently oversubscribed, and there is an enrollment cap and waitlist. This Partnership Program therefore allows greater opportunity to pursue the BSME degree. Table 1, on enrollment projections, is based on 20 students entering the program in its first year, building to a cohort of 30 entering students by the third year.

Although the Partnership Program has been conceived as a 4-year sequence assuming full-time attendance, it is expected that there will be interest in part-time attendance by working students. This option will increase the time to degree and will require alternative course planning on the part of the student, with guidance from a Partnership Program advisor. We also expect interest from professionals in industry who may wish to enroll in one or more upper-division courses as non-degree seeking students.

#### **B.1.b. Bona Fide Need: Workforce Demand**

Western-slope business leaders have expressed strong interest in hiring engineering students and believe that a program delivered in Grand Junction will not only help stimulate local economic growth but also increase the likelihood that program graduates will seek employment within the region rather than migrating to Colorado's Front Range or elsewhere.

The highly versatile mechanical engineering degree allows for graduates to work in a variety of areas/industries upon graduation. Mechanical engineering, versus other engineering specialties, was selected for several reasons. First, as the single largest program in CU-Boulder's College of Engineering and Applied Science, mechanical engineering reflects strong student demand. Second, the program meets broader, statewide employment needs as documented by the data from the Department of Labor and Employment. That agency projects a 26.9% increase in jobs over the decade 2005 – 2015.

#### **B.2. Role and Mission Criteria**

Serving the citizenry of Colorado by enrolling a student population from diverse geographic areas within Colorado is a goal of both Mesa State College and the CU-Boulder campus. This partnership allows collaboration of two institutions to serve a geographic area that currently does not offer any bachelor's degree in engineering.

The CU-Boulder campus already confers the BSME degree. The Partnership Program would allow for the establishment of the first engineering baccalaureate program provided entirely on the Western Slope of Colorado.

#### **B.3. Duplication**

Currently, conference of bachelor degrees in mechanical engineering is limited to institutions along the Front Range in Colorado (University of Colorado at Boulder, University of Colorado Denver, University of Colorado at Colorado Springs, Colorado State University, University of Denver, U.S. Air Force Academy, Colorado School of Mines-engineering with mechanical emphasis). This proposal, a collaboration of two state institutions, broadens the geographic opportunity for Colorado students to pursue a proven and accredited undergraduate degree in mechanical engineering.

#### **B.4. Statutory Requirements**

The proposed program conforms to all statutory requirements.

#### **C.1. Admission, Transfer, and Graduation Standards**

First-time freshman applicants who meet both Mesa State's general admission requirements and CU-Boulder's College of Engineering and Applied Science Guaranteed Admission Requirements for Colorado Freshmen can be admitted to the program at the outset.

If a first-time student does not meet the MSC general and CU Engineering admissions criteria, he or she may be admitted to MSC's pre-mechanical engineering track and apply for admission to the program at the end of the freshman year, when the following are achieved:

- 2.9 GPA for all courses taken at MSC
- Complete 2-course sequence in calculus with a grade of 'B' or higher, and complete a 2-course physical science sequence (calculus-based physics or college-level chemistry) with a grade of 'B' or higher.

The above requirements may typically be met in one year. However, students may also transfer into the program any time prior to beginning the upper-division courses, if they have earned a 2.9 cumulative GPA and completed all required lower-division coursework (even if they did not receive grades of 'B' or better in all courses of the math and science sequences noted above).

Good academic standing in the program will be monitored according to current policies at MSC in the first and second years, and according to the current policies of the CU-Boulder College of Engineering and Applied Science in the third and fourth years.

The standard BSME degree graduation requirements from the CU-Boulder College of Engineering and Applied Science apply.

#### **C.2. Curriculum Description and Assessment Process**

The learning goals of the BSME degree program are to be met through lecture, laboratory, and capstone design coursework. The program is designed to give students

knowledge of engineering fundamentals and problem solving with specific emphasis on mechanical engineering problems and practices.

Requirements for the BSME degree include completion of 128 semester hours, as required for engineering accreditation, of approved core and elective courses with a minimum 2.00 grade point average.

The curriculum to be followed by students in the Partnership Program is presented below.

**FRESHMAN YEAR FALL SEMESTER (MSC oversight)**

MATH 151-5 Calculus I  
PHYS 131-4 Fundamental Mechanics  
PHYS 131L-1 Fundamental Mechanics Lab  
CADT 108-3 CAD –Mechanical  
Humanities/Social Sciences Elective - 3  
TOTAL 16

**FRESHMAN YEAR SPRING SEMESTER (MSC oversight)**

MATH 152-5 Calculus II  
ENGR 1xx-3 First-Year Engineering Projects  
PHYS 132-4 Electromagnetism and Optics  
PHYS 132L-1 Electromagnetism and Optics Lab  
CSCI 111-4 Computer Science I  
TOTAL 17

**SOPHOMORE YEAR FALL SEMESTER (MSC oversight)**

MATH 253-4 Calculus III  
CHEM 151-4 Engineering Chemistry  
CHEM 151L-1 Engineering Chemistry Lab  
ENGR 261-3 Statics and Structures (name change)  
Humanities/Social Sciences Elective - 3  
TOTAL 15

**SOPHOMORE YEAR SPRING SEMESTER (MSC oversight)**

MATH 2xx-4 Differential Equations and Linear Algebra  
ENGR 2xx-3 Mechanics of Solids  
ENGR 2xx-3 Materials Science  
PHYS 231-3 Modern Physics  
Humanities/Social Sci. Elective - 3  
TOTAL 16

**JUNIOR YEAR FALL SEMESTER (CU-Boulder oversight)**

MCEN 3012-3 Engineering Thermodynamics  
MCEN 3021-3 Fluid Mechanics  
MCEN 3030-3 Computational Methods  
ECEN 3010-3 Circuits and Electronics

Humanities/Social Science Elective (Upper Division) - 3  
TOTAL 15

**JUNIOR YEAR SPRING SEMESTER (CU-Boulder oversight)**

MCEN 3022-3 Heat Transfer  
MCEN 3025-3 Component Design  
MCEN 3037-2 Experimental Design & Data Analysis  
MCEN 3043-3 Dynamics  
MCEN 4122-3 Thermodynamics 2  
ENGL 425-3 Scientific Writing  
TOTAL 17

**SENIOR YEAR FALL SEMESTER (CU-Boulder oversight)**

MCEN 4026-3 Manufacturing Processes & Sys.  
MCEN 4043-3 System Dynamics  
MCEN 4045-3 ME Design Project 1  
MCEN 4037-2 Measurements Lab  
General Technical Elective - 3  
Humanities/Social Science Elective (Upper Division) - 3  
TOTAL 17

**SENIOR YEAR SPRING SEMESTER (CU-Boulder oversight)**

MCEN 4085-4 ME Design Project 2  
MCEN 4047-2 ME Laboratory  
MCEN Technical Elective - 3  
MCEN Technical Elective - 3  
General Technical Elective - 3  
TOTAL - 15

NOTE: Courses without a number are currently being developed at MSC and a course number will be assigned during the 2008-09 academic year.

The management and evaluation of the mechanical engineering program will be coordinated by the chief academic officers of the two institutions or their respective designees. It is the intent that the institutions partner in a long-term commitment to the success of the program. The initial program commitment by both institutions is for ten years. After the first five years, a joint evaluation will be undertaken on the feasibility and possible timing of a potential transfer of the program administration to Mesa State College. Both institutions will participate in a collaborative annual review of the program in June of each year to ensure that the cooperative agreement is meeting the needs of the students and the mutual needs of the two institutions, and that the quality, learning outcomes and students in the program are sufficient to assure a viable academic program. Further, the parties agree to include as part of the annual review an assessment that considers the requirements of accreditation by the Accreditation Board of Engineering and Technology (ABET). If either institution concludes that the program should be terminated, that determination shall be communicated in writing, and

arrangements will be made to offer a two-year teach-out to enable students to complete the program in Grand Junction or Boulder.

### **C.3. Professional Requirements or Evaluations**

The University of Colorado at Boulder is accredited under the North Central Association of Colleges and Schools. The BS in Mechanical Engineering degree is accredited by the Accreditation Board for Engineering and Technology (ABET). The next ABET general review for the CU-Boulder BSME program is scheduled for 2011-2012, and a review of the new mode of offering the degree will be required. CU-Boulder faculty and staff will take the lead for the accreditation process and be supported by MSC faculty and staff, with accreditation costs shared equally by the two institutions.

Faculty members involved in the Partnership Program include (one-page vitae for each in Appendix A):

Gigi Richard, Ph.D. (rostered as MSC faculty member)  
MSC Faculty Coordinator  
MSC contact and teaches selected lower-division coursework

Daria Kotys-Schwartz, Ph.D. (rostered as CU-Boulder faculty member)  
CU Faculty Coordinator  
CU-Boulder contact and liaison on CU-Boulder campus

TBD and hired in 2008-2009 (rostered as CU-Boulder faculty member)  
BSME Program Director  
Oversight of program and liaison/coordination between two institutions; teaches upper-division coursework

TBD and hired starting Fall 2010 (rostered as CU-Boulder faculty member)  
Teaches upper-division coursework

TBD and hired starting Fall 2010 (rostered as CU-Boulder faculty member)  
Teaches upper-division coursework

Martin Dunn, Ph.D. (rostered as CU-Boulder faculty member)  
Chair, Mechanical Engineering Department  
CU-Boulder

### **C.4. Institutional Factors**

Serving the citizenry of Colorado by enrolling a student population from diverse geographic areas within Colorado is a goal of both Mesa State College and the CU-Boulder campus. This partnership allows collaboration of two institutions to serve a geographic area that currently does not offer any bachelor's degree in engineering.

Mechanical engineering students will have access to the full range of services offered to all MSC students including the MAVzone portal, library, academic support services, MAVcard, athletic events, etc. CU-Boulder will provide student access to appropriate library materials, in either print or electronic format, for the upper-division portions of the program through the MSC library.

Students in the first two years of the mechanical engineering program are eligible to apply for financial aid at MSC. Students in the final two years of the mechanical engineering program are eligible to apply for financial aid at CU-Boulder. Some funds have been specifically earmarked at both institutions to support students in the program. Use of these funds will be coordinated between Mesa State's Financial Aid Office and CU-Boulder's Financial Aid Office.

Students enrolled in MSC classes in the first two years of the program will be considered MSC students for administrative and tuition purposes. Once a student is admitted into the mechanical engineering program and enrolls in CU-Boulder courses starting with the junior year, he or she will be considered a CU student for administrative and tuition purposes. The details of student registration and billing will be coordinated between the MSC and CU-Boulder Registrars and Bursars. Students in the program will be advised by MSC faculty and staff, and by CU-Boulder faculty and staff, as appropriate.

MSC will designate sufficient beds in Grand Mesa Hall for students enrolled in the mechanical engineering program to facilitate a student learning community.

In addition to the formal MSC/CU-Boulder partnership, synergy with the Western Colorado Math and Science Center (WCMSC) is expected. The Western Colorado Math and Science Center, located in Grand Junction, has been selected by Governor Ritter of Colorado as a Science, Technology, Engineering, and Mathematics (STEM) Regional Compact Center, earmarked to significantly help math and science K-12 education. Cooperative outreach efforts with WCMSC will increase the pool of interested and qualified applicants to the Partnership Program.

### **C.5. Physical Capacity and Needs**

Mesa State will provide classrooms, computer lab spaces, and office space for CU-Boulder faculty/staff involved in program delivery. MSC also will provide the necessary computing infrastructure and library collection needed to support the lower-division portion of the program. Although Mesa State has primary oversight for the lower-division portion of the program, and CU-Boulder has primary oversight for the upper-division portion of the program, Mesa State has oversight of facilities and equipment for the entire program. CU-Boulder and MSC will each pay half of the initial costs (not to exceed \$250K each, without mutual agreement) for laboratory equipment required for the BSME program. This equipment will be owned by MSC, which will be responsible for repair, replacement, calibration, and maintenance of this equipment. Table 2 provides physical capacity estimates.

## **C.6. Cost Description and Source of Funds**

Mesa State College will have responsibility for the costs associated with the lower-division portion of the curriculum, as well as upper-division electives, whereas CU-Boulder will have responsibility for the costs associated with the upper-division mechanical engineering portion of the curriculum (except that MSC will be responsible for the facilities and equipment, as noted previously). Students will pay applicable MSC tuition and course fees while enrolled in the first two years of courses, whereas they will pay applicable CU-Boulder tuition and course fees once they begin taking the upper-division courses. Twenty-five percent of the collected CU-Boulder tuition, course fees, and COF revenues will be provided to MSC for costs associated with MSC facilities and elective courses.

Mesa State College is responsible for delivering the lower-division portion of the mechanical engineering degree program. Estimated startup and ongoing costs are provided in Table 3 (with dark gray background).

The University of Colorado at Boulder is responsible for delivering the upper-division portion of the mechanical engineering degree program. Estimated startup and ongoing costs are provided in Table 3 (with light gray background). The startup costs include one-half of the lab-equipment purchase cost, funds to recruit faculty and provide startup support for their positions, and funds for course development, travel, and videoconferencing equipment. The largest ongoing costs for operating expenses are personnel. A Director will be cost-shared by CU-Boulder and MSC for the first two years, focusing on program development and recruiting, and will subsequently be paid by CU-Boulder to teach upper-division courses as well as direct the program. Starting in the third year, two additional faculty will be employed by CU-Boulder to teach upper-division courses, and a part-time person is expected to be added in the fourth year to provide the technical breadth necessary for these courses. A part-time assistant will be hired to help with the mechanical engineering instructional laboratories, and student assistants will be employed part-time to help with the upper-division courses. A faculty member and a staff member will support the program from Boulder; their responsibilities will include ongoing assessment required for accreditation, program/course development and training/support for instructors on site at MSC, supporting students in the program by interfacing with CU-Boulder Offices of Admissions, Financial Aid, etc., and providing release time so that regular CU-Boulder faculty are able to be involved in course instruction for the coordinated program at MSC. Besides personnel support, the ongoing operating expenses include lab/course supplies, programmatic costs such as events and software expenses, funds to support faculty development and student/faculty projects, student scholarships, and travel expenses.

The CU President's Office has committed \$450,000 in one-time funding for startup costs. For the CU-Boulder ongoing costs, the CU President's Office has committed \$150,000 per year. Revenue from tuition, fees, and COF of the upper-division students is expected to provide approximately \$300,000 per year (40 students x \$10,000/student x 0.75) at steady state (see Table 3 for detailed estimates), engineering scholarship endowment

funds will provide \$50,000 per year, other grants and donations are expected to provide \$25,000 per year, and the College of Engineering and Applied Science and Provost/Chancellor's office will split the remainder required (estimated at about \$100,000 per year).

Attached is a statement from Dean Davis (Appendix B) verifying the adequacy of resources to support this program and confirming that the projected resources and reallocations are reasonable.

#### **C.7. Other Relevant Information**

Please find accompanying this proposal a MSC/CU-Boulder Mechanical Engineering Degree Program Memorandum of Understanding, dated February 18, 2008, with signatures dated February 22, 2008 (Appendix C).

## TABLE 1: ENROLLMENT PROJECTIONS

### Mesa State College & University of Colorado at Boulder Proposal for a Coordinated Degree in Mechanical Engineering July 2008

Name of Program: BS in Mechanical Engineering

Name of Institution: University of Colorado at Boulder, in partnership with Mesa State College

**DEFINITIONS:**

Academic year is the period beginning July 1 and concluding June 30.

Headcount projections represent an unduplicated count of those students officially admitted to the program and enrolled at the institution during the academic year.

FTE is defined as the full-time equivalent number of those students majoring in the program, regardless of the classes enrolled, during the academic year.

Program graduate is defined as a student who finishes all academic program requirements and graduates with a formal award within a particular academic year.

**SPECIAL NOTES:**

To calculate the annual headcount enrollment, add new enrollees to the previous year headcount and subtract the number who graduated in the preceding year. Adjust by the anticipated attrition rate.

To calculate FTE, multiply the number of students times the projected number of credit hours students will be typically enrolled in per year and divide by 30.

The data in each column is the annual unduplicated number of declared program majors. Since this table documents program demand, course enrollments are not relevant and shall not be included in the headcount or FTE data.

		Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Full Implementation
1-a	In-state Headcount	20	41	63	83	89	92
1-b	Out-of-State Headcount	0	0	0	0	0	
2	Program Headcount	20	41	63	83	89	92
3-a	In-state FTE	20	41	63	83	89	92
3-b	Out-of-state FTE	0	0	0	0	0	0
4	Program FTE	20	41	63	83	89	92
5	Program Graduates	0	0	0	12	15	18

Enrollment Table prepared by:

Martin Dunn, Chair, Mechanical Engineering Department, & Mary Steiner, Assistant Dean for Students, CU-Boulder College of Engineering and Applied Science, July 2008

Philip P. D. Dales, Provost  
Signature of Governing Board Information Officer

7-17-08  
Date



## TABLE 2: PHYSICAL CAPACITY ESTIMATES

### Mesa State College & University of Colorado at Boulder Proposal for a Coordinated Degree in Mechanical Engineering July 2008

Name of Program: BS in Mechanical Engineering

Name of Institution: University of Colorado at Boulder, in partnership with Mesa State College

Purpose: This table documents the physical capacity of the institution to offer the program and/or the plan for achieving the capacity. Complete A or B.

**Part A**

I certify that this proposed degree program can be fully implemented and accommodate the enrollment projections provided in this proposal without requiring additional space or renovating existing space during the first five years.

\_\_\_\_\_  
Governing Board Capital Construction Officer

\_\_\_\_\_  
Date

**Part B**

	Column 1	Column 2	Column 3		Column 4		Column 5	Column 6
ASSIGNABLE SQUARE FEET	TOTAL NEEDED	AVAILABLE	RENOVATION		NEW CONSTRUCTION		LEASE/RENT	REVENUE SOURCE*
TYPE OF SPACE			Immed.	Future	Immed.	Future		
Classroom	600	674	--	756	N/A	N/A		
Instructional Lab	6,100	3,851	1,500	3,298	N/A	N/A		
Offices	1,699	449	--	1,425	N/A	N/A		
Study	1,200	1,200	--	987	N/A	N/A		
Special/General Use	--	--	--	--	N/A	N/A		
Other: Elevator + Tool Crib	569	192	377	--	N/A	N/A		
<b>TOTAL</b>	<b>10,168</b>	<b>6,366</b>	<b>1,877</b>	<b>6,466</b>	<b>N/A</b>	<b>N/A</b>		

\* Capital Construction Fund (CCF), Research Building Revolving Fund (RBRF), Gift (GIFT), Grant (GR), Auxiliary Fund (AUX)

Institutional Physical Capacity Table prepared by:

Carol Futhey, Vice President for Academic Affairs, Mesa State College, May 2008

Philip P. DeStefano, Provost  
Governing Board Capital Construction Officer

7-17-08  
Date



**TABLE 3: PROJECTED EXPENSE AND REVENUE ESTIMATES**

**Mesa State College & University of Colorado at Boulder  
 Proposal for a Coordinated Degree in Mechanical Engineering  
 July 2008**

MSC Expenses/Revenue in Dark Gray  
 CU-Boulder Expenses/Revenue in Light Gray

		ESTIMATED AMOUNT in DOLLARS				
		YEAR 1 (FY08-09)	YEAR 2 (FY09-10)	YEAR 3 (FY10-11)	YEAR 4 (FY11-12)	YEAR 5 (FY12-13)
<b>Operating Expenses</b>						
1	Faculty salary and benefits (est. \$50,000 salary + 25% benefits - .75 in year 1, 1.5 in year 2, 2 in year 3, 3 in years 4 & 5)	\$46,875	\$93,750	\$125,000	\$187,500	\$187,500
2	Financial Aid specific to program	\$44,000	\$44,000	\$44,000	\$44,000	\$44,000
3	Instructional Materials	\$55,400	\$16,500	\$16,500	\$16,500	\$16,500
4	Program Administration	\$38,000	\$38,000	\$38,000	\$38,000	\$38,000
5	Computing/Networking	\$59,400	\$16,500	\$16,500	\$16,500	\$16,500
6	Laboratory Maintenance			\$75,000	\$75,000	\$75,000
7	Other Operating Costs	\$4,000	\$4,000	\$4,000	\$4,000	\$4,000
8	Program Director salary and benefits (est. \$75,000 salary + 26.8% benefits; costs shared by MSC in years 1 & 2)			\$95,000	\$95,000	\$95,000
9	Salary and benefits for CU faculty on-site at MSC (\$60,000 salary + 26.8% benefits - 2 in year 3 and 2.5 thereafter)			\$152,000	\$190,000	\$190,000

10	Salary and benefits for CU faculty (\$60,000 salary + 26.8% benefits) and staff (\$40,000 + 27.7% benefits - 3/4 time years 1 & 2, full-time thereafter) supporting the program from Boulder			\$117,000	\$117,000	\$117,000
11	Part-time laboratory assistant			\$25,000	\$25,000	\$25,000
12	Student assistants for labs and courses (3 students @ \$3,000 per semester)			\$18,000	\$18,000	\$18,000
13	Lab and course supplies			\$10,000	\$10,000	\$10,000
14	Program operations (software, events, student societies, . . .) and contingency			\$55,000	\$55,000	\$55,000
15	Seed grants and professional development funds for faculty			\$50,000	\$50,000	\$50,000
16	Student scholarships			\$25,000	\$50,000	\$50,000
17	Travel expenses for CU/MSC exchange			\$15,000	\$15,000	\$15,000
18	Total MSC Operating Expenses	\$247,675	\$212,750	\$319,000	\$381,500	\$381,500
19	Total CU Operating Expenses	\$0	\$0	\$562,000	\$625,000	\$625,000
20	Total Combined Operating Expenses	\$247,675	\$212,750	\$881,000	\$1,006,500	\$1,006,500
<b>Program Start-Up Expenses</b>						
21	Capital Construction	\$144,200	\$75,000			
22	Library Acquisitions	\$30,000	\$5,000	\$5,000	\$5,000	\$5,000
23	Laboratory Equipment (50%)	\$125,000	\$125,000			
24	Program Director salary and benefits (est. \$75,000 salary + 26.8% benefits; costs shared by CU & MSC in years 1 & 2)	\$47,500	\$47,500			
25	Laboratory Equipment (50%)	\$125,000	\$125,000			

26	Program Director salary and benefits (est. \$75,000 salary + 26.8% benefits; costs shared by CU & MSC in years 1 & 2)	\$47,500	\$47,500			
27	Salary and benefits for CU faculty (\$60,000 salary + 26.8% benefits) and staff (\$40,000 + 27.7% benefits - 3/4 time years 1 & 2, full-time thereafter) supporting the program from Boulder	\$104,500	\$104,500			
28	Faculty recruiting and startup funds	\$50,000	\$50,000			
29	Course development, travel, videoconferencing	\$50,000	\$50,000			
30	Total MSC Program Start-Up Expenses	\$346,700	\$252,500	\$5,000	\$5,000	\$5,000
31	Total CU Program Start-Up Expenses	\$377,000	\$377,000	\$0	\$0	\$0
32	Total Combined Program Start-Up	\$723,700	\$629,500	\$5,000	\$5,000	\$5,000
<b>TOTAL MSC PROGRAM EXPENSES</b>		\$594,375	\$465,250	\$324,000	\$386,500	\$386,500
<b>TOTAL CU PROGRAM EXPENSES</b>		\$377,000	\$377,000	\$562,000	\$625,000	\$625,000
<b>TOTAL COMBINED PROGRAM EXPENSES</b>		\$971,375	\$842,250	\$886,000	\$1,011,500	\$1,011,500
<b>Enrollment Revenue</b>						
33	General Fund: State Support (COF) for lower-division students	\$58,880	\$120,704	\$147,200	\$158,976	\$158,976
34	Cash Revenue: Tuition for lower-division students	\$86,492	\$177,309	\$216,230	\$233,528	\$233,528
35	Cash Revenue: General Fees for lower-division students	\$8,666	\$17,764	\$21,664	\$23,397	\$23,397

36	General Fund: State Support (COF) for upper-division students (25%)			\$9,863	\$21,307	\$26,018
37	Cash Revenue: Tuition for upper-division students (25%)			\$27,510	\$59,434	\$72,574
38	Cash Revenue: Course Fees for upper-division students (25%)			\$503	\$1,086	\$1,326
39	General Fund: State Support (COF) for upper-division students (75%)			\$29,588	\$63,922	\$78,053
40	Cash Revenue: Tuition for upper-division students (75%)			\$82,531	\$178,303	\$217,721
41	Cash Revenue: Course Fees for upper-division students (75%)			\$1,508	\$3,257	\$3,977
Other Revenue						
42	Federal Grants					
43	Corporate Grants/Donations	\$340,000	\$150,000	\$25,000		
44	CU President's Office	\$600,000	\$150,000	\$150,000	\$150,000	\$150,000
45	Scholarship Endowment Funds			\$25,000	\$50,000	\$50,000
46	Other Grants and Donations			\$25,000	\$25,000	\$25,000
47	College of Engineering & Applied Science			\$50,000	\$50,000	\$50,000
48	Provost/Chancellor			\$50,000	\$50,000	\$50,000
49	Institutional Reallocation					
<b>TOTAL MSC PROGRAM REVENUE</b>		<b>\$494,038</b>	<b>\$465,777</b>	<b>\$447,969</b>	<b>\$497,728</b>	<b>\$515,818</b>
<b>TOTAL CU PROGRAM REVENUE</b>		<b>\$600,000</b>	<b>\$150,000</b>	<b>\$413,626</b>	<b>\$570,482</b>	<b>\$624,750</b>
<b>TOTAL COMBINED PROGRAM REVENUE</b>		<b>\$1,094,038</b>	<b>\$615,777</b>	<b>\$861,595</b>	<b>\$1,068,210</b>	<b>\$1,140,568</b>

**NOTES:**

COF, tuition, and fees are based on Fall 2008 semester rates.

25% of CU-Boulder tuition, COF, and course fee revenue will be transferred to MSC.

Program expenses listed above do not include general overhead expenses associated with the Mesa State campus.

## APPENDIX B



University of Colorado at Boulder

College of Engineering and Applied Science

Robert H. Davis, Dean  
Engineering Center, ECAD 100  
1111 Engineering Drive, 422 UCB  
Boulder, CO 80309-0422 USA

Tel: 303.492.7006; Fax: 303.492.2199  
Long distance: 800.456.2537  
Email: [robert.davis@colorado.edu](mailto:robert.davis@colorado.edu)  
Website: <http://engineering.colorado.edu>

### MEMORANDUM

**DATE:** 6 May 2008

**TO:** Phil DiStefano, Provost

**CC:** Mary Steiner, Assistant Dean for Students  
Martin Dunn, Chair of Mechanical Engineering

**FROM:** Robert H. Davis, Dean & Tisone Chair *Robert H Davis*

**RE:** Coordinated BS Degree in Mechanical Engineering

I am pleased to fully endorse the proposal for the partnership between Mesa State College and the University of Colorado to offer a Bachelor of Science in Mechanical Engineering degree from CU-Boulder to students in residence at Mesa State College. This new program is timely and fits with the strategic mission of our college and CU to serve the needs of Colorado in many ways:

1. Mechanical engineering is currently our most popular major, and the program will allow for the education of mechanical-engineering students in small-class settings.
2. Students from the Western Slope of Colorado, including many who are first-generation college students or from low-income families, will now have access to a premier education in engineering without needing to move to the Front Range of Colorado or out of state.
3. Employers in energy and other growing industries in Western Colorado will have access for the first-time to a locally trained workforce with professional engineering degrees.

I also verify the adequacy of resources to support the CU-Boulder portion of the new program, as outlined in the proposal. These resources will be provided from tuition, fees and college-opportunity-fund revenue, a substantial commitment of new funding from the CU President's Office, commitments from both your and my offices, and gift funds. With respect to the latter, the scholarship endowment in our college will make available approximately \$50,000 per year in scholarships for qualifying students enrolled in the upper-division portion of the program, an alumnus has donated \$500,000 to start an endowment to help support these scholarships and related outreach/program efforts on the Western Slope, and additional fundraising efforts are underway.



## APPENDIX C

2/18/08

### **Memorandum of Understanding Mechanical Engineering Degree Program Mesa State College and the University of Colorado - Boulder**

The purpose of this memorandum of understanding (MOU) is to summarize a partnership between Mesa State College (MSC) and the University of Colorado at Boulder (CU Boulder). The goal of the partnership is to expand student access in Colorado so that students can complete an undergraduate engineering program in residence in Grand Junction (GJ). More specifically, the MOU outlines agreements associated with the cooperative delivery of the Bachelor of Science in Mechanical Engineering (B.S.M.E.) program by CU Boulder, supported by Mesa State, on the MSC campus. Mesa State and the University of Colorado at Boulder agree to the following points:

- 1. Recruitment:** Active recruitment of students for the mechanical engineering program will be the shared responsibility of both institutions. Both institutions' recruitment materials, such as printed brochures and websites, will reflect clearly that the earned degree is fully accredited by the Accreditation Board for Engineering and Technology (ABET) and said degree will be conferred by the University of Colorado at Boulder, with the first cohort of freshmen starting the program on the Mesa State campus in Fall 2008.
- 2. Application and Admission:** A student seeking enrollment in the mechanical engineering program shall apply to and meet the general admissions requirements of Mesa State. Additionally, a student must meet admissions requirements of CU Boulder, either by being jointly accepted by both institutions at the outset or by enrolling first at Mesa State and then, prior to beginning either the sophomore or junior year of the program, meeting program admission requirements specified in the applicable CU Boulder Competitive Transfer Guidelines or CU Boulder/MSC Guaranteed Transfer Agreement. CU and MSC will execute this Guaranteed Transfer Agreement prior to March 1, 2008. Prior to admission by CU Boulder, students will be classified as pre-mechanical engineering students at MSC. Students applying to the program will pay Mesa State's application fees only. MSC will offer general orientation to the students, and CU Boulder may offer a supplemental activity to deal with unique aspects of enrolling in the pre-engineering program.
- 3. Financial Aid:** Students in the first two years of the mechanical engineering program are eligible to apply for financial aid at MSC. Students in the final two years of the mechanical engineering program are eligible to apply for financial aid at CU Boulder. Some funds have been specifically earmarked at both institutions to support students in the program. Use of these funds will be coordinated between Mesa State's Financial Aid Office and CU Boulder's Financial Aid Office.
- 4. Registration:** Students enrolled in MSC classes in the first two years of the program will primarily be considered MSC students for administrative purposes, but they will be afforded certain privileges of CU students. Once a student is admitted into the mechanical engineering program and enrolls in CU Boulder courses starting with the junior year, he or she will primarily be considered a CU student for administrative purposes, but will be afforded

certain privileges of MSC students. The details of student registration and billing will be coordinated between the MSC and CU Boulder Registrars and Bursars. Students in the program will be advised by MSC faculty and staff, and by CU Boulder faculty and staff, as appropriate.

5. **Tuition, Fees, and COF:** MSC will be responsible for the costs associated with offering the first two years of the B.S.M.E. degree. Mesa State tuition and course fees will be charged, and MSC will receive 100% of the revenue (including COF) from students in the first two years of the program. These students will be administered as MSC students, but they will be afforded certain privileges of CU Boulder students, including appropriate advising and access to library materials.

CU Boulder will be responsible for teaching the mechanical engineering courses during the third and fourth years of the degree program. Students in the final two years of the program will be charged CU Boulder tuition and course fees. CU Boulder will receive 75% of tuition and course fee revenue (including COF) from these students, and MSC will receive the remaining 25%. These students will be administered as CU Boulder students, but they will be afforded certain privileges of MSC students, including library access, health plan, and other student services. They will also be able to take the MSC elective courses necessary to complete their degree requirements.

Only MSC general student fees, or the equivalent, will be charged, for all four years of the program. These fees will be received by MSC to provide for student services at the resident campus.

6. **Student Services:** Mechanical engineering students will have access to the full range of services offered to all MSC students including the MAVzone portal, library, academic support services, MAVcard, athletic events, etc. CU Boulder will provide student access to appropriate library materials, in either print or electronic format, for the upper division portions of the program through the MSC library.
7. **Designated Residence Hall Space:** Mesa State will designate sufficient beds in Grand Mesa Hall for students enrolled in the mechanical engineering program to facilitate a student learning community.
8. **Curriculum, Staffing, and Program Delivery:** Students completing the B.S.M.E. degree in Grand Junction will experience a program equal in quality to that delivered on the CU Boulder campus. Mesa State commits to offer each year the necessary lower-division courses, in the semester sequencing coordinated with CU Boulder, to enable first-year students to begin the program in Fall 2008 and continue in an annual cycle. Mesa State also will offer the necessary courses, beginning in Fall 2009, that result in a complete second-year set of offerings consistent with degree requirements for mechanical engineering students.

CU Boulder will offer, beginning in Fall 2010, the upper-division mechanical engineering courses necessary for students to fulfill their engineering degree requirements. Courses

completed by students at other Colorado public institutions will be accepted into the program in accordance with existing CU Boulder Engineering credit transfer guidelines.

Students will be subject to the academic policies and procedures according to the applicable institutional classification of the student.

An MSC faculty member, who will be initially responsible for teaching the GEEN 1400 freshman projects course and serve as the MSC Faculty Coordinator for the B.S.M.E. program, will be identified by January 2008. This faculty member will visit CU Boulder as needed during the Spring and Fall 2008 semesters to observe and interact with mechanical engineering faculty and students at CU Boulder. CU Boulder will assist with travel and related expenses, and will provide required support (office, telephone, etc.) during these visits. The objective is for the identified faculty member to be ready to teach GEEN 1400 at MSC in Spring 2009.

CU Boulder shall, by Fall 2008, hire the first of three faculty members who will teach upper-division B.S.M.E. courses at MSC. This faculty member, who will serve as the B.S.M.E. Program Director at MSC, will spend AY 2009 and 2010 building the necessary partnerships with CU Boulder and MSC faculty, business and community leaders, K-12 educators, high-school teachers and administrators, and MSC students in the first two years of the program. It is recommended that this faculty member spend one semester in residence at CU Boulder becoming familiar with the ME faculty and curriculum and one semester in residence MSC becoming familiar with the MSC faculty and curriculum. The rest of the time will be spent traveling as needed between the two institutions and communities. The cost of this faculty member for the first two years will be shared equally by CU Boulder and MSC, and be the responsibility of CU Boulder after the first two years.

MSC will provide appropriate support for CU Boulder faculty homed at MSC. The CU Boulder faculty members will also be considered to be, and have all relevant privileges of, MSC faculty. MSC will also provide the necessary administrative assistance for the program, including program support, student advising, and accreditation coordination.

**9. Facilities and Equipment:** Mesa State will provide classrooms, computer lab spaces, and office space for CU Boulder faculty/staff involved in program delivery. MSC also will provide the necessary computing infrastructure and library collection needed to support the lower division portion of the program. CU Boulder and MSC will each pay half of the initial costs (not to exceed \$250K each, without mutual agreement) for laboratory equipment required for the B.S.M.E. program. This equipment will be owned by MSC, which will be responsible for repair, replacement, calibration, and maintenance of this equipment.

**10. Program Accreditation:** CU Boulder faculty and staff will take the lead for the accreditation process and be supported by MSC faculty and staff, with accreditation costs shared equally by the two institutions. No student will graduate from the program at MSC prior to 2012. If a more advanced student is admitted into the program prior to this date (this will not occur except under special circumstances on an individual basis), that student will be required to transfer to CU Boulder for degree completion.

**11. Program Management and Evaluation:** The management and evaluation of the mechanical engineering program will be coordinated by the chief academic officers of the two institutions or their respective designees. It is the intent that the institutions partner in a long-term commitment to the success of the program. The initial program commitment by both institutions is for ten years. After the first five years, a joint evaluation will be undertaken on the feasibility and possible timing of a potential transfer of the program administration to Mesa State College. Both institutions will participate in a collaborative annual review of the program in June of each year to ensure that the cooperative agreement is meeting the needs of the students and the mutual needs of the two institutions, and that the quality, learning outcomes and students in the program are sufficient to assure a viable academic program. Further, the parties agree to include as part of the annual review an assessment that considers the requirements of accreditation by the Accreditation Board of Engineering and Technology (ABET). If either institution concludes that the MOU should be terminated, that determination shall be communicated in writing, and arrangements will be made to offer a two-year teach-out to enable students to complete the program in Grand Junction or Boulder.

**12. Signatures:**

For Mesa State College:

For The University of Colorado at Boulder:

Carol Futhey 2/22/08  
 Carol Futhey Date  
 Vice President for Academic Affairs

Robert N. Davis 2/22/08  
 Robert Davis Date  
 Dean, College of Engineering and Applied  
 Science

Tim Foster 2/22/08  
 Tim Foster Date  
 President

Phil DiStefano 2/22/08  
 Phil DiStefano Date  
 Executive Vice Chancellor and Provost

G.P. "Bud" Peterson 2/22/08  
 G.P. "Bud" Peterson Date  
 Chancellor

Hank Brown 2/22/08  
 Hank Brown Date  
 President