Memorandum

From: ME Graduate Program Committee
To: CEM Curriculum Committee
Re: Fast Track Mechanical Engineering Bachelor/Master Degrees

The Department of Mechanical Engineering proposes a new integrated Mechanical Engineering B.S./M.S. degree program for qualified undergraduate students to complete B.S. and M.S. degrees in a shorter time than traditional B.S. plus M.S. degrees. The combined accelerated degree for Mechanical Engineering undergraduate students is designed for students to complete both Bachelor of Science and Master of Science in five years. The basic rationales for the program are:

1. Better use of University resources
2. Leverage existing strong B.S. programs to increase graduate enrollment
3. A national trend in a highly demanding field
4. An attractive option for qualified undergraduate students

Students, university, and industry are the three most important components for technology advancement in engineering. This is an integrated program through planning and commitments, for students with excellent academic achievements, and is a win-win-win (WWW) program. Students can finish both degrees in a shorter time without sacrificing educational quality in the discipline. The university can retain excellent undergraduate students in the graduate program and increase the enrollment and throughput. Mechanical Engineering graduates have accepted positions with corporations such as Shell, BP, GE, Boeing, GM as well as government agencies (state and federal), research institutes and centers. They are the mainstream industrial workforces for the new globalization era.

We are not requesting additional resources for the proposed degree program. Information regarding existing resources is readily available in recent ABET (2005,2007) as well as UAF Program Assessment (2007) reports. Consequently, we request a waiver of the Resource Commitment form.

Approval:

[Signatures]
Department Chair
Curriculum Council Chair
Dean
Dean of Graduate School
President, UAF Faculty Senate
Chancellor
President
Board of Regents
Proposal

B.S./M.S. Degrees for Excellent Mechanical Engineering Students

Submitted to

Graduate School

University of Alaska Fairbanks

September 18, 2008
# Table of Contents

I. Proposal Summary ................................................................. 2
II. Background ........................................................................... 2
III. Proposed Program ............................................................... 3
IV. Benefits to UAF and Students ................................................. 4
V. Personnel Directly Involved with the Program ......................... 4
VI. Enrollment Information ....................................................... 5
VII. Resources Requirements .................................................. 5
VIII. Implementation Plan .......................................................... 5
IX. Assessment ........................................................................... 5
X. Notes ....................................................................................... 6
XI. Regents Guidelines ............................................................... 6
XII. Sample Five-Year Study Plan ............................................... 7
XIII. Sample Three-Year Teaching Plan ........................................ 8
XIV. Mechanical Engineering B.S. and M.S. Enrollments and Graduates Data .... 9
Combined Mechanical Engineering B.S./M.S. Degree: 
A Proposal for an Accelerated (Fast-Track) Degree Program

I. Proposal Summary

The Department of Mechanical Engineering proposes a NEW integrated B.S./M.S. degree program for qualified undergraduate students to complete B.S. and M.S. degrees in a shorter time than traditional B.S. plus M.S. degrees.

II. Background

The Department of Mechanical Engineering proposes a combined accelerated degree for Mechanical Engineering undergraduate students. This program is designed for students to complete both a Bachelor of Science and a Master of Science Degree in five years. The basic rationales for the program are:

1. Better use of University resources
2. Leverage existing strong B.S. programs to increase graduate enrollment
3. A national trend in a highly demanding field
4. An attractive option for qualified undergraduate students

The following examples are programs available in the U.S. for combined B.S./M.S. degree programs:

1. University of Alaska Fairbanks: The Computer Science Department offers a five year combined B.S./M.S. program. 
   http://www.cs.uaf.edu/cs/grad/BSMSCheckList.html

2. Texas A&M University: The Look College of Engineering offers a fast track B.S./M.S. program, beginning graduate studies at the end of the junior year and may complete the B.S. and M.S. degrees within five years. 
   http://essap.tamu.edu/fasttrack.htm

3. University of Texas Arlington: The Materials Science and Engineering Department offers a five-year joint program that allows a student to earn a bachelor's degree in the Physics Department followed by a master's degree in the Materials Science and Engineering Department. 
   http://www.uta.edu/mse/fasttrack.pdf

4. Florida Institute of Technology offers a fast track B.S./M.S. in Engineering. It combines a Bachelor’s degree in engineering with a Master’s degree in engineering. Engineering majors with a cumulative 3.4 GPA and who have completed 95 credits are eligible. 
   http://www.fit.edu/ugrad/adminfo/documents/TransferFastTrackFS.pdf

5. The University of California San Diego Mechanical and Aerospace Engineering programs offer an integrated B.S./M.S. degree program with either a thesis or comprehensive exam option. This 5-year program requires an upper-division GPA of 3.5 to apply. 
   http://maeweb.ucsd.edu/undergrad/degree/degree_prog.php#bsmsprogram

6. University of Illinois at Urbana-Champaign: The Departments of Computer Science and Accountancy offer a five year joint program that allows a student to earn a bachelor's degree in either department followed by a master's degree in the other department. 
   http://www.cs.uiuc.edu/undergraduate/programs.php#bsms
7. George Mason University: Qualified undergraduate students may apply for a five-year combined B.S./M.S. program leading to a Bachelor of Science in an engineering discipline and an MSSE degree. The combined B.S./M.S. program can be completed in 144 credit hours. http://ite.gmu.edu/undergraduates/accelerated_bs_ms.php

III. Proposed Program

1. Complete the following admission requirements:
   a. ME major (junior preferred) or senior standing.
   b. GPA 3.25 or above (based on minimum of 24 credits in ME major requirements). Students must maintain a cumulative GPA of 3.0 to remain in the program.
   c. Submit three letters of references.
   d. Submit GRE (general) scores.
   e. Submit a study goal statement.
   f. Submit a UAF graduate application for admission.

2. Complete the general university requirements.
3. Complete B.S. degree requirements (As part of the B.S. degree requirements, complete MATH F201X, PHYS F211X and PHYS F212X).
4. Complete the master’s degree requirements.
5. Complete the following B.S. program (major) requirements:

   ES F101-Introduction to Engineering 3
   ES F201-Computer Techniques 3
   ES F209-Statics 3
   ES F210-Dynamics 3
   ES F301-Engineering Analysis 3
   ES F307-Elements of Electrical Engineering 3
   ES F331-Mechanics of Materials 3
   ES F341-Fluid Mechanics 4
   ES F346-Basic Thermodynamics 3
   ESM F450W-Economic Analysis and Operations 3
   MATH F202X-Calculus 4
   MATH F302-Differential Equations 3
   ME F302-Dynamics of Machinery 4
   ME F308-Measurement and Instrumentation 3
   ME F313-Mechanical Engineering Thermodynamics 3
   ME F321-Industrial Processes 3
   ME F334-Elements of Materials Science/Engineering 3
   ME F403-Machine Design 3
   ME F408-Mechanical Vibrations 3
   ME 415W-Thermal Systems Laboratory 3
   ME 441-Heat and Mass Transfer 3
   ME 487 W,O-Design Project 3

6. Complete the following M.S. program (major) requirements:

   ME F631-Advanced Mechanics of Materials 3
   ME F634-Advanced Materials Engineering 3
   ME F641-Advanced Fluid Mechanics 3
   ME F642-Advanced Heat Transfer 3
   ME F608-Advanced Dynamics 3

7. Complete the thesis or non-thesis requirements:
Thesis
Complete the following:
ME F699-Thesis  6
Electives*  9

Non-Thesis
Complete the following:
ME F698-Project  3
Electives**  12

*At least 3 credits at the graduate level.
**At least 6 credits at the graduate level.
Electives are ME or other engineering, science, or mathematics courses at F400-level or above approved by the student’s advisory committee.

8. A minimum of 150 credits is required for both degrees.

Note: This degree program must be completed in 7 years or the student will be disqualified from the program. If a student is disqualified for exceeding the 7 year limit for the fast track degree program, a ME B.S. will be awarded if: 1) completed in 10 years, and 2) meet ME B.S. requirements.

Taken separately, the degrees would require 161 credits (131 B.S. and 30 M.S.). The difference of 11 credits comes from the electives of the B.S. program:
   a. Taking the B.S. degree and the M.S. degree separately, the student needs to take 11 elective credits (6 for ME electives, 3 for technical electives, and 2 for free electives) for the B.S. degree, another 9 or 12 graduate elective credits for the M.S. degree for the non-thesis and thesis option, respectively.
   b. Taking the B.S./M.S. degree, the student needs to take 9 or 12 elective credits (for thesis and non-thesis option, respectively) instead of both B.S. elective credits and M.S. elective credits.

The minimization of overlaps, maximizing the benefits of continuity, and taking graduate level courses in lieu of undergraduate ones justify the reduction.

See section XII for an attached example of a 5-year study plan.

IV. Benefits to UAF and Students

1. Increase graduate enrollment
2. Reach critical mass in Mechanical Engineering graduate program for future funding opportunities
3. Attract exceptional and advanced undergraduate students
4. Increase University throughput
5. Reduce student total education cost
6. A model for other demanding degrees/programs
7. Create possibility of inter-department combined degrees
8. Provide workforce needed for university/state research community

V. Personnel Directly Involved with the Program

See attached resumes of directly involved ME faculty.

It is important to note that many faculty members in Mechanical Engineering are funded by external grants based on the high caliber research that they are conducting. These grants generally include research assistantship at both the graduate and undergraduate levels. Professor Jonah Lee has worked on theoretical and experimental solid mechanics, finite element and material point methods. Dr. Ed Bargar has worked on
thermodynamics and energy systems, controls and instrumentation, HVAC and building systems. Dr. Cheng-fu Chen has worked on computational mechanics, reliability of electronic packaging, motion planning and controls. Professor Deben Das has worked on fluid mechanics, heat transfer and cold regions engineering. Professor Doug Goering has worked on computational fluid mechanics, heat transfer, geotechnical and arctic heat transfer. Professor Ron Johnson has worked on fluid mechanics, energy systems, air pollution, water and wastewater treatment. Dr. Chuen-Sen Lin has worked on machine design, CAD, mechanical system modeling and simulation. Dr. Rorik Peterson has worked on frost heave, frozen ground engineering, and atmospheric dispersion modeling. Dr. Jing Zhang has worked on material science and engineering, multi-scale modeling, coupled phenomena with applications to processing. Dr. Gang Sheng has worked on dynamics, acoustics and tribology applied to automotive systems, data storage systems, and mechanical/structural systems in arctic regions. This is an excellent research department and will provide valuable experience to our students who choose to enter this program.

For the past three years, 22 of the ME M.S. students were funded in the form of research assistantships related to the high quality research being conducted by faculty members. As the program grows, we expect the number of research opportunities to grow.

VI. Enrollment Information

See section XI for the current enrollments and graduates in the past five years.

Projected enrollment is 4 to 8 students per year with a maximum of 30 students in total. This will triple the current and recent enrollments, and triple the graduate credit hour production. In the past, we spent most our efforts on recruiting outside graduate students (both national and international) and most of our graduate students are international. In recent years, we have seen a significant drop in the number of international applicants to our graduate program that is attributed to globalization and rapid economic developments in countries such as India and China. This program aims to discover a "new" source of our homegrown excellent students. On average, we have about 13 undergraduate and 5 M.S. graduates each year with the number expected to increase as indicated by the recent increase in mechanical engineering undergraduate enrollment. We are able to provide a quality educational experience to these additional students without extra resources.

VII. Resources Requirements

The department had a peak of enrollment of 22 M.S. students in 2003 and 2004 without any issues in resources. Consequently, we are not requesting additional resources for the proposed program.

VIII. Implementation Plan

1. Departmental Approval- Sept. 15, 2008, Department of Mechanical engineering
2. College Approval- Sept. 30, 2008, CEM
3. Senate approval- Oct. 16, 2008, UAF Faculty Senate
4. Board Approval- Dec. 2008, UA Board of Regent
5. Student recruitment- In Spring 2009, all qualified ME students will receive an invitation to this program
6. Open house- In Spring 2009 all qualified students are invited to a program orientation
7. Program starts- Fall 2009

IX. Assessment

The Mechanical Engineering Department has assessment plans for the B.S. and M.S. degrees. These assessments will be applied to this program also as the students will be receiving both degrees. These
assessments are done on a regular basis for the Graduate School, Accreditation Boards, and department self-study. After three years of the program, we will do an assessment of

1. the number of students applied, admitted, and graduated
2. their career paths
3. their feedback on the program

This will enable the Mechanical Engineering Faculty to judge the effectiveness of this program independent of the traditional B.S. and M.S. programs and make recommendations on how to further improve the program.

X. Notes

Double major with Mechanical Engineering’s fast track program is possible but is only recommended for highly qualified individuals due to the additional requirements in ME B.S. Double major with the fast track will have the same requirements as other combined degree students as far as ME major is concerned.

XI. Regents Guidelines

The Department of Mechanical Engineering proposes a NEW integrated Mechanical Engineering B.S./M.S. degree program for qualified undergraduate students to complete B.S. and M.S. degrees in a shorter time than traditional B.S plus M.S. degrees. The combined accelerated degree for Mechanical Engineering undergraduate students is designed for students to complete both a Bachelor of Science and a Master of Science in five years. The basic rationales for the program are:

1. Better use of University resources
2. Leverage existing strong BS programs to increase graduate enrollment
3. A national trend in a highly demanding field
4. An attractive option for qualified undergraduate students

Students, university, and industry are three most important components for technology advancement. Since this is an integrated program for excellent students through planning and commitments, it is a win-win-win (www) program. Students can finish both degrees in shorter time without sacrificing educational quality in the discipline. The university can retain excellent undergraduate students in the graduate program to increase enrollment and throughput. Mechanical Engineering graduates have accepted positions with Shell, BP, GM, GE, Boeing as well as government agencies (state and federal), research institutes and centers. They are mainstream workforces for the mechanical, automotive and aerospace areas.
XII. Sample Five-Year Study Plan

<table>
<thead>
<tr>
<th>YEAR 1</th>
<th>FALL</th>
<th>credits</th>
<th>SPRING</th>
<th>credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Math 200X</td>
<td>4</td>
<td>Math 201X</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>ES 101</td>
<td>3</td>
<td>ES 201</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Core 1</td>
<td>3</td>
<td>Core 2</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Chem 105X</td>
<td>4</td>
<td>Chem 106X</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>English 111</td>
<td>3</td>
<td>Comm 131/141</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>17</td>
<td><strong>Total</strong></td>
<td>17 = 34</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>YEAR 2</th>
<th>FALL</th>
<th>credits</th>
<th>SPRING</th>
<th>credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Math 202X</td>
<td>4</td>
<td>Math 302</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>ES 209</td>
<td>3</td>
<td>ES 210</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>ME 321</td>
<td>3</td>
<td>ES 346</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>English 211/213</td>
<td>3</td>
<td>Core 3</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Physics 211X</td>
<td>4</td>
<td>Physics 212X</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>17</td>
<td><strong>Total</strong></td>
<td>16 = 33</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>YEAR 3</th>
<th>FALL</th>
<th>credits</th>
<th>SPRING</th>
<th>credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ES 307</td>
<td>3</td>
<td>ES 341</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Core 4</td>
<td>3</td>
<td>Core 5</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>ME 302</td>
<td>3</td>
<td>ME 313</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>ES 301</td>
<td>3</td>
<td>ME 334</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>ES 331</td>
<td>4</td>
<td>ME 308</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>16</td>
<td><strong>Total</strong></td>
<td>16 = 32</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>YEAR 4</th>
<th>FALL</th>
<th>credits</th>
<th>SPRING</th>
<th>credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ME 441</td>
<td>3</td>
<td>ME 403</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>ME 408</td>
<td>3</td>
<td>ME 415</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>ME 4xx or 6xx</td>
<td>3</td>
<td>ME 487 W,O</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>ME 6xx</td>
<td>3</td>
<td>ME 6xx</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>ESM 450W</td>
<td>3</td>
<td>Core 6</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>15</td>
<td><strong>Total</strong></td>
<td>15 = 30</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>YEAR 5</th>
<th>FALL</th>
<th>credits</th>
<th>SPRING</th>
<th>credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ME 6xx</td>
<td>3</td>
<td>ME 6xx</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>ME 4xx or 6xx</td>
<td>3</td>
<td>ME 6xx</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>ME 6xx</td>
<td>3</td>
<td>ME 6xx/699</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>ME 698/699</td>
<td>3</td>
<td>ME 6xx/699</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>12</td>
<td><strong>Total</strong></td>
<td>9 = 21</td>
<td></td>
</tr>
</tbody>
</table>

**Total** 150
## XIII. Sample Three-Year Teaching Plan

### Mechanical Engineering

### Sample Three-Year Plan of ME Courses

**Fall 2009-Spring 2012**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Fall 09</th>
<th>Spring 10</th>
<th>Fall 10</th>
<th>Spring 11</th>
<th>Fall 11</th>
<th>Spring 12</th>
</tr>
</thead>
<tbody>
<tr>
<td>ME 302</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>ME 308</td>
<td></td>
<td>x</td>
<td>x</td>
<td></td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>ME 313</td>
<td>x</td>
<td></td>
<td>x</td>
<td></td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>ME 321</td>
<td>x</td>
<td></td>
<td></td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ME 334</td>
<td>x</td>
<td></td>
<td>x</td>
<td></td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>ME 403</td>
<td></td>
<td>x</td>
<td>x</td>
<td></td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>ME 408</td>
<td>x</td>
<td></td>
<td></td>
<td>x</td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>ME 415</td>
<td>x</td>
<td></td>
<td>x</td>
<td></td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>ME 441</td>
<td>x</td>
<td></td>
<td>x</td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>ME 487</td>
<td></td>
<td>x</td>
<td>x</td>
<td></td>
<td>x</td>
<td></td>
</tr>
</tbody>
</table>

### ELECTIVE

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Fall 09</th>
<th>Spring 10</th>
<th>Fall 10</th>
<th>Spring 11</th>
<th>Fall 11</th>
<th>Spring 12</th>
</tr>
</thead>
<tbody>
<tr>
<td>ME 401</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>ME 409</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>ME 414</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>ME 416</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>ME 450</td>
<td></td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ME 451</td>
<td></td>
<td></td>
<td></td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ME 452</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>ME 453</td>
<td></td>
<td></td>
<td></td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ME 458</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ME 464</td>
<td>x</td>
<td></td>
<td>x</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### GRADUATE

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Fall 09</th>
<th>Spring 10</th>
<th>Fall 10</th>
<th>Spring 11</th>
<th>Fall 11</th>
<th>Spring 12</th>
</tr>
</thead>
<tbody>
<tr>
<td>ME 601</td>
<td></td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>ME 602</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>ME 608</td>
<td></td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>ME 609</td>
<td></td>
<td></td>
<td>x</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ME 617</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>ME 631</td>
<td></td>
<td></td>
<td>x</td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>ME 634</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>ME 641</td>
<td></td>
<td></td>
<td></td>
<td>x</td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>ME 642</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>ME 658</td>
<td></td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>ME 685</td>
<td></td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>ME 687</td>
<td></td>
<td></td>
<td>x</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### PROJECT

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Fall 09</th>
<th>Spring 10</th>
<th>Fall 10</th>
<th>Spring 11</th>
<th>Fall 11</th>
<th>Spring 12</th>
<th>Fall 12</th>
</tr>
</thead>
<tbody>
<tr>
<td>ME 698</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>ME 699</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
</tbody>
</table>
XIV. Mechanical Engineering B.S. and M.S. Enrollments and Graduates Data

<table>
<thead>
<tr>
<th>Degree</th>
<th>Fall 03</th>
<th>Fall 04</th>
<th>Fall 05</th>
<th>Fall 06</th>
<th>Fall 07</th>
<th>Fall 08</th>
</tr>
</thead>
<tbody>
<tr>
<td>B.S. Enrollment</td>
<td>81</td>
<td>81</td>
<td>89</td>
<td>81</td>
<td>102</td>
<td>122</td>
</tr>
<tr>
<td>B.S. Graduate</td>
<td>10</td>
<td>11</td>
<td>13</td>
<td>18</td>
<td>8</td>
<td>13</td>
</tr>
<tr>
<td>M.S. Enrollment</td>
<td>22</td>
<td>22</td>
<td>19</td>
<td>12</td>
<td>7</td>
<td>8</td>
</tr>
<tr>
<td>M.S. Graduate</td>
<td>4</td>
<td>5</td>
<td>9</td>
<td>3</td>
<td>8</td>
<td>4</td>
</tr>
</tbody>
</table>
How does the program relate to the **Education** mission of the University of Alaska and the MAU?

The proposed program aims to fulfill the education mission of the Department of Mechanical Engineering: To offer the highest quality, contemporary education at the undergraduate and graduate levels and to perform research appropriate to the technical needs of the State of Alaska, the nation and the world.

We have discussed the development of the program within the department, faculty staff and students, colleagues at UAF including the Computer Science Department which has a similar program to the one being proposed. Since this is a Mechanical Engineering specific program, there should be no impact on other existing programs.

**What State Needs** met by this program.

The proposed program, through retaining and advanced training of our own excellent undergraduate students, will provide much needed high-quality workforce for the State of Alaska for economic development.

**What are the Student opportunities and outcomes?**  **Enrollment projections?**

The combined accelerated degree for Mechanical Engineering undergraduate students is designed for excellent students to complete both a Bachelor in Science and a Master in Science in five years. Students receive advanced training by taking graduate level classes and conducting high-level research at a reduced cost and reduced time. The training should enhance the career paths and options of the graduates.

Projected enrollment is 4 to 8 students per year with a maximum of 30 students total.

**Describe Research opportunities:**

Students will conduct research through either the project or thesis option. There is a wide range of challenging research topics and projects, many are cold-regions related, for the students to choose.

**Describe Fiscal Plan for development and implementation:**

Existing resources are adequate for the proposed program.
A. MISSION AND GOALS:

**Mission:** The mission of the Department of Mechanical Engineering is to offer the highest quality, contemporary education at the undergraduate and graduate levels and to perform research appropriate to the technical needs of the State of Alaska, the nation and the world.

The basic rationales for the program are:

1. Better use of University resources
2. Leverage existing strong B.S. programs to increase graduate enrollment
3. A national trend in a highly demanding field
4. An attractive option for qualified undergraduate students

Students, university, and industry are the three most important components for technology advancement in engineering. This is an integrated program through planning and commitments, for students with excellent academic achievements, and is a win-win-win (www) program. Students can finish both degrees in a shorter time without sacrificing educational quality in the discipline. The university can retain excellent undergraduate students in the graduate program and increase the enrollment and throughput. Mechanical Engineering graduates have accepted positions with corporations such as Shell, BP, GE, Boeing, GM well as government agencies (state and federal), research institutes and centers. They are the mainstream industrial workforces for the new globalization era.

**Delivery Method:** The program will use the same delivery method as the current B.S. and M.S. programs.

B. AUTHORIZATION:

The University of Alaska Fairbanks (UAF) is one of four individually accredited universities within the University of Alaska system. UAF has been continuously accredited since 1934 by the Northwest Commission on Colleges and Universities.

The Constitution of the State of Alaska establishes the University of Alaska as the state university, governed by a Board of Regents appointed by the governor. Alaska Statutes provide for a board of eleven voting members, including one student, with authority to carry out the mission of the university system and its constituent units, including the determination and regulation of the university’s course of instruction and the conferring of degrees. Members of the board have no contractual, employment, or financial interest in the university. The chair is elected from among the board. The board appoints the president of the university system, who in turn appoints the chancellor of UAF. Both officers are full-time employees whose only responsibility is to the institution.

1) How does the program relate to the Education Mission of the University of Alaska?

UAF’s mission statement:

“The University of Alaska Fairbanks, as the nation’s northernmost Land, Sea, and Space Grant university and international research center, advances and disseminates knowledge through creative teaching, research, and public service with an emphasis on Alaska, the North and their diverse peoples.”
Being a combined degree program, the new degree program fulfill the missions of UAF and the Department of Mechanical Engineering in the same way as our current stand-alone B.S. and M.S. programs.

2) The following UAF 2010 Strategic Goals are met through the fast track B.S./M.S. program:

1. Increase student participation in and opportunities for experiential learning
2. Increase research programs that address the Arctic and its indigenous people
3. Increase the proportion of students and faculty engaged in research and scholarly activities
4. Increase, promote and monitor undergraduate research opportunities, activities and accomplishments
5. Increase enrollment with an emphasis in selected areas such as programs of distinction and high demand job areas

3) Needs of Alaskans being met by this program

Students, university, and industry are the three most important components for technology advancement in engineering. This is an integrated program through planning and commitments, for students with excellent academic achievements, and is a win-win-win (www) program. Students can finish both degrees in a shorter time without sacrificing educational quality in the discipline. The university can retain excellent undergraduate students in the graduate program and increase the enrollment and throughput. Mechanical Engineering graduates have accepted positions with corporations such as Shell, BP, GE, Boeing, GM well as government agencies (state and federal), research institutes and centers. They are the mainstream industrial workforces for the new globalization era.

C. EDUCATIONAL OFFERINGS:

Descriptive information of the fast track Mechanical Engineering Bachelor/Master Degrees:

1. Complete the following admission requirements:
   a. ME major (junior preferred) or senior standing.
   b. GPA 3.25 or above (based on minimum of 24 credits in ME major requirements). Students must maintain a cumulative GPA of 3.0 to remain in the program.
   c. Submit three letters of references.
   d. Submit GRE (general) scores.
   e. Submit a study goal statement.
   f. Submit a UAF graduate application for admission.
2. Complete the general university requirements.
3. Complete B.S. degree requirements (meeting current ME B.S. core requirements).
4. Complete the following program (major) requirements:
   a. Current ES 101, ES 2XX, ES 3XX, ME 3XX, ME 403, ME 408, ME 415, ME 441, ME 487, and ESM 450 requirements.
5. Complete the following ME master core courses:
   a. ME 608, ME 631, ME 634, ME 641, and ME 642.
   b. Complete ME master research project ME 698 or thesis ME 699.
6. Complete a minimum of 12 credits of ME upper division/graduate electives (at least 6 at the graduate level).
7. Pass a comprehensive exam in the areas of mechanical, thermal and fluid systems.
8. A minimum of 149 credits is required for both degrees. (Taken separately, the degrees would require 161 credits. The minimization of overlaps and maximizing the benefits of continuity justify the reduction).
Note: This degree program must be completed in 7 years or the student will be disqualified from the program. If a student is disqualified for exceeding the 7 year limit for the fast track degree program, a ME B.S. will be awarded if: 1) completed in 10 years, and 2) meet ME B.S. requirements.

D. PLANNING

We have discussed the development of the program within the department, faculty staff and students, colleagues at UAF including the Computer Science Department which has a similar program to the one being proposed. Since this is a Mechanical Engineering specific program, there should be no on other existing programs.

Projected enrollment is 4 to 8 students per year with a maximum of 30 students total. This will triple the current enrollments and triple the graduate credit hour production. In the past, we spent most our efforts on recruiting outside graduate students (both national and international) and most of our graduate students are international ones. In recent years, we have seen a significant drop in the number of international applicants to our graduate program that is attributed to globalization and rapid economic developments in countries such as India and China. This program aims to discover a “new” source of our homegrown excellent students. On average, we have about 13 undergraduate and 5 M.S. graduates each year with the number expected to increase as indicated by the recent increase in mechanical engineering undergraduate enrollment. We are able to provide a quality educational experience to these additional students without extra resources.

Implementation timetable is as follows:

1. Departmental Approval- Sept. 15, 2008, Department of Mechanical engineering
2. College Approval- Sept. 30, 2008, College of Engineering and Mines
3. Senate approval- Oct. 16, 2008, UAF Faculty Senate
4. Board Approval- Dec. 2008, UA Board of Regent
5. Student recruitment- In Spring 2009, all qualified ME students will receive an invitation to this program
6. Open house- In Spring 2009 all qualified students are invited to a program orientation
7. Program starts- Fall 2009

E. BUDGET

No additional resources are requested for the proposed degree.

F. STUDENT SERVICES

No special requirements for student services.

G. PHYSICAL FACILITIES

Existing facilities will be used.

H. LIBRARY AND INFORMATION RESOURCES:

Existing resources are adequate.

I. FACULTY AND STAFF

Current faculty and staff are adequate for the new degree program.