

The University Senate of Michigan Technological University

ACCELERATED MASTER'S PROGRAMS

([Proposal 13-11](#)) ([Proposal 1-12](#))

Senate Policy 413.1

Goals of the Proposed Policy:

- Develop a flexible policy framework that will allow individual departments/programs to offer integrated bachelor's/master's degree programs that meet the needs of their students, faculty, and academic discipline.
- Allow students in coursework degree programs (those that require neither a thesis nor a report) to apply a limited number of credits towards both the bachelor's and master's degrees.
- Allow outstanding undergraduate students to pursue an accelerated research-based master's degree and apply up to three undergraduate-level research credits earned as a senior-level student toward the research requirement for a master's degree (thesis or report option).
- Attract outstanding Michigan Tech bachelor's students into our master's programs.

Policy Guidelines:

For Programs:

- The recommended curriculum for an accelerated master's program must be established in advance by each department or program that wishes to offer an accelerated master's program to their students.
- Recommended curricula for accelerated master's programs can allow students to apply up to a maximum of six of the credits earned while an undergraduate to both their bachelor's and master's degree.

A maximum of three of the double-counted credits may be research credits. Programs may choose to not allow or limit the double-counting of either coursework or research credits or both.

- Any research credits earned by an undergraduate and applied toward a master's degree must be earned after the student has attained senior-level standing.
- Undergraduate students may not enroll in graduate research courses. Undergraduates who participate in research should enroll in undergraduate research courses.
- Up to a maximum of three credits of undergraduate research earned during the senior year may be substituted for graduate-level research credits if allowed by the graduate program.
- Only students in a research-based (thesis or report option) master's program may apply any undergraduate research credits toward a graduate degree.
- Accelerated master's programs must require students to complete a minimum of 150 total credits for the bachelor's and master's combined.

- The maximum time to degree for students in an accelerated master's program is 5 years from the time the student is accepted into the program.
- Proposed accelerated master's programs that will result in students earning bachelor's and master's degrees that are both currently offered by Michigan Tech do not have to be reviewed or approved by the University Senate as they do not involve development of new degree programs.
- This policy cannot be used to develop stand-alone accelerated master's programs.
- Each plan for an accelerated master's programs must be reviewed by the Graduate School prior to the time it is made available to students. The Graduate School will ensure that the plan conforms to this policy and will make information about programs available to the Graduate Faculty Council and the University Senate and will advertise the programs on the Graduate School website.

For Students

- Only students who intend to complete both their bachelor's and master's degrees at Michigan Tech can enroll in an accelerated master's program.
- Students already enrolled in a graduate program may not retroactively use this policy.
- In order to be formally accepted into an accelerated master's program students must apply to and be accepted into the Graduate School at Michigan Tech. Applications will be reviewed by departments and programs according to their normal procedure.
- Students can apply for admission to an accelerated master's program at any time after they attain sophomore-level class standing and up until they are awarded their bachelor's degree.
- Only students with a cumulative GPA of 3.0 or above are eligible to enter an accelerated master's program. Programs may set higher admission requirements. For example, programs may require a cumulative GPA of 3.5 for admission to a research-based (thesis or report option) master's program.
- Students who are accepted to the program will not be allowed to continue if their cumulative undergraduate GPA falls below 3.0. A higher GPA may be required by the program.

For University Administration

- Students will be considered undergraduates for the purposes of financial aid, tuition, and class standing until their undergraduate degree has been awarded.
- Once students are awarded their undergraduate degree, they will be considered graduate students for the purposes of financial aid, and tuition.
- Prior to completion of the master's degree, students must indicate on their master's degree schedule which undergraduate-level courses (if any are allowed by the program) and credits (up to a maximum of six, if allowed by the program for an accelerated master's degree) should be applied to both their bachelor's and master's degrees.
- The Dean of the Graduate school will report to the Senate on the number of accelerated master's programs, enrollment in these programs, the number of enrolled master's students who received their undergraduate degree from Michigan Tech and the number of these that are in accelerated master's programs. In addition, this report will include a comparison with the data from previous years.

Financial Analysis:

During the 2010-2011 recruiting season a total of 229 students who received a BS from Michigan Tech applied to graduate school here. Of those, 132 were accepted to a graduate program. Table 1 shows the final recruiting results and how values for 2010 differed from those for the preceding year (2009).

Table 1: Data for the 52-week period ending August 28, 2010. Values shown are for the students who completed a Michigan Tech undergraduate degree and applied to graduate school here.

Number of Applicants who Received BS from Michigan Tech	Change from Prior Year (2010-2009)	Number of Accepted Students who Received BS from Michigan Tech	Change from Prior Year (2010- 2009)
229	-1	132	-16

The proposed policy is anticipated to result in both revenue loss and revenue generation.

Revenue will be lost by the University for students who pay take courses as an undergraduate that are also applied to their graduate degree. The maximum amount of revenue that will be lost in such cases is equivalent to 6 credits times the graduate tuition rate, currently \$625 per credit.

If all of the 132 students who completed a BS degree at Michigan Tech took advantage of the new policy this would result in a loss of revenue of $132 * 6 * 625 = \$495,000$.

Revenue will be generated by this policy if students choose to continue at Michigan Tech to complete a graduate degree. To offset the revenue loss identified above (\$495,000), the University would need to recruit an additional 33 students (assuming that each of these students pays for 24 rather than 30 credits).

It is anticipated that recruiting additional students will be enhanced by this policy and it seems likely that 33 additional students could be recruited each year. As our graduate programs develop formal statements of curricula plans that could lead to completion of both a bachelor's and a master's degree within a 5-year time frame, the number of students recruited should continue to grow.

It must be noted that our current Senior Rule policy makes it possible for Michigan Tech undergraduates to earn up to 10 graduate level credits for which they pay undergraduate tuition. These credits can later be used at Michigan Tech *or applied toward a graduate degree elsewhere*. The proposed policy is intended to make it much more likely for students making use of our current policy to continue their graduate education, particularly at the master's level, here at Michigan Tech in order to justify this investment in our students' graduate education

Sample Curricula:

As part of the benchmarking process leading to this proposal, similar programs at other universities were examined. "4+1" programs are becoming increasingly common, and many allow for a reduction in the required number of graduate for a graduate degree – either through double-counting or a formal articulation for specific programs.

Example 1: B.S/M.S. Program in Applied and Engineering Physics – University of Colorado (obtained from:

http://www.colorado.edu/physics/Web/education/undergrad/BS_MS_EPEN.pdf)

This is an example of a “concurrent” degree in Applied and Engineering Physics BS/MS in which both the BS and MS are awarded upon completion of the program. It differs from the policy proposed for implementation at Michigan Tech in that the Michigan Tech policy

would lead to students completing the BS first, followed by completion of the MS; this is a good example of a 5-year curriculum however.

B.S./M.S. Program in Applied and Engineering Physics

Statement of Purpose: The proposed B.S./M.S. program in Applied and Engineering Physics aims to provide new opportunities for undergraduate Engineering Physics majors. The program is specifically addressed to the students in Plan 4 Engineering Physics Major Program of the Department of Physics. The Plan 4 major gives students a thorough grounding in theoretical physics, applied mathematics, and broad exposure to engineering topics, so that they are well prepared either to proceed with graduate work or with professional employment in either basic science or in applied fields. For students interested in graduate studies, the combined B.S./M.S. program in Applied and Engineering Physics allows an early start on graduate course work and on research in a broad range of areas (see below). This early exposure should allow students to save one or two semesters in the time needed to begin Ph.D. work. For students interested in immediate professional employment, the B.S./M.S. program would serve as a terminal degree program that qualifies students for a higher level of employment.

1. Admission to the program: Students are eligible to apply for the program at the end of the first semester of their junior year (or upon completion of the typical first semester Junior physics courses as described in the Plan 1 curriculum) and may apply at any time thereafter prior to completion of their undergraduate studies. Applications are available in the main office of the Department of Physics. The applicant should normally have a minimum GPA of 3.0 at the time of application (petitions for admission from students with a lower GPA will be considered). The application should be accompanied by recommendation letters from two professors with whom the applicant took/are taking upper division physics courses. The applicant should also produce a letter of acceptance from a faculty sponsor/advisor to do research towards their Master's thesis. Upon acceptance of the applicant into the program at the departmental level, the application will be forwarded to the Deans of the College of Engineering and Applied Sciences and the Graduate School for endorsement.

2. Continuation in the program: In order to continue in the program after admission, the minimum cumulative GPA required at the end of the senior year, with 128 hours completed, is normally 3.0. After the senior year, the student should maintain a cumulative GPA of 3.0 (B) in graduate physics courses.

3. Curriculum: The following charts show a typical curriculum for years 1 through 4 and the first year of graduate studies.

Fall	Spring
<u>Freshman Year</u> PHYS 1110-4, General Physics 1	<u>Freshman Year</u> PHYS 1120-4, General Physics 2 PHYS 1140-1, Exper. Physics 1
<u>Sophomore Year</u> PHYS 2140-3, Methods of Theoretical Physics	<u>Sophomore Year</u> PHYS 2170-3 Foundations of Modern Physics PHYS 2150-1, Exper. Physics 2
<u>Junior Year</u> PHYS 3210-3, Analytical Mechanics PHYS 3310-3, Principles of Electricity and Magnetism 1	<u>Junior Year</u> PHYS 3220-3 Quantum Mechanics and Atomic Physics 1

PHYS 3330-2, Electronics for the Physical Sciences	PHYS 3320-3, Principles of Electricity and Magnetism 2
<u>Senior Year</u> PHYS 4230-3, Thermodynamics and Statistical Mechanics PHYS 4410-3, Quantum Mechanics and Atomic Physics 2 3 credits of Physics elective.	<u>Senior Year</u> 3 credits of Physics laboratory elective. 3 credits of Physics elective

Example 2: B.S./M.S. Degrees for Excellent Mechanical Engineering Students – University of Alaska (obtained from:

http://www.alaska.edu/uaf/cem/me/uafME_msbsFastTrack.pdf)

This is an example of a program in Mechanical Engineering that is designed to allow students to complete both a BS and an MS in less than the normally required amount of time. This is a good example of a program in engineering.

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

The Department of Mechanical Engineering offers 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.

Program Requirements:

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.

FALL	credits	SPRING	credits
Math 200X	4	Math 201X	4
ES 101	3	ES 201	3
Core 1	3	Core 2	3
Chem 105X	4	Chem 106X	4
English 111	3	Comm 131/141	3
	17	= 17	34
<u>YEAR 2</u>			
FALL	credits	SPRING	credits
Math 202X	4	Math 302	3
ES 209	3	ES 210	3
ME 321	3	ES 346	3
English 211/213	3	Core 3	3
Physics 211X	4	Physics 212X	4
	17	= 16	33
<u>YEAR 3</u>			
FALL	credits	SPRING	credits
ES 307	3	ES 341	4
Core 4	3	Core 5	3
ME 302	3	ME 313	3
ES 301	3	ME 334	3
ES 331	4	ME 308	3
	16	= 16	32
<u>YEAR 4</u>			
FALL	credits	SPRING	credits
ME 441	3	ME 403	3
ME 408	3	ME 415	3
ME 4xx or 6xx	3	ME 487 W,O	3
ME 6xx	3	ME 6xx	3
ESM 450W	3	Core 6	3
	15	= 15	30
<u>YEAR 5</u>			
FALL	credits	SPRING	credits
ME 6xx	3	ME 6xx	3
ME 4xx or 6xx	3	ME 6xx	3
ME 6xx	3	ME 6xx/699	3
ME 698/699	3		
	12	= 9	21
total			150

Proposal 13-11:

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Proposal 1-12:

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