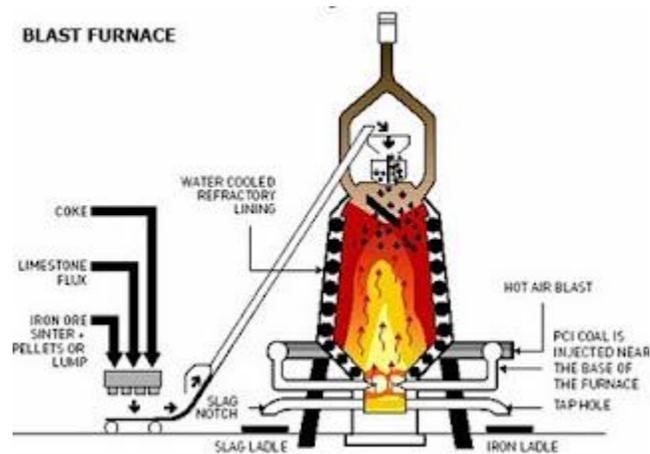
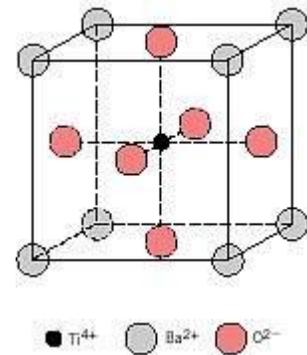


Metallurgical and Materials Engineering Colorado School of Mines Undergraduate Guide



*Forged Aluminum Pistons
and Connecting Rods*



Version 3

August 2015

Introduction

The aim of these guidelines is to provide undergraduate students in Metallurgical and Materials Engineering a single reference to address the questions that arise with regard to policies and procedures at CSM and within the MME program. The Guide gives details about the requirements at CSM to earn your BS in Metallurgical and Materials Engineering. It should provide you with appropriate information so that you can properly plan your coursework. The Guide also describes details about other opportunities that are available to you - internships, research activities, study abroad, scholarships, etc. If you find errors in these guidelines or have suggestions for improvement please let us know so that the next edition will provide better help to future MME students.

We hope that you find the Guide a good resource and that it is helpful to you. This Guide does not replace your academic Advisor nor does it prevent you from seeking face to face help and guidance from your Advisor. By having correct information in a single document, we hope that the process of making choices can go more smoothly.

We are indebted to Profs. Slamovich and Johnson of Purdue University who wrote the Undergraduate Manual for Materials Engineering Students at Purdue. Their Guide is excellent document and in places we have with permission duplicated their text.

Sincerely,

Gerald Bourne
Chair MME Undergraduate Affairs Committee

Chester Van Tyne
MME Associate Department Head

Version History:

- Version 1: August 2012
- Version 2: August 2013
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Table of Contents

Introduction.....	2
Table of Contents.....	3
1. Academic and Professional Conduct	5
1.1 Academic Integrity.....	5
1.2 Engineering Professional Ethics	5
2. MME Undergraduate Degree Program Requirements.....	6
2.1 Minimum Degree Requirements for Metallurgical and Materials Engineering	6
2.2 Metallurgical and Materials Engineering Course Work	7
2.3 Metallurgical and Materials Engineering Tracks.....	9
2.3.1 MME Track -- Physical and Manufacturing Metallurgy	10
2.3.2 MME Track -- Ceramic and Electronic Materials	11
2.3.3 MME Track -- Physicochemical Processing of Materials	12
2.3.4 MME Track -- Biomaterials.....	13
2.4 MME Curriculum Flowchart	14
2.4.1 Caution about Prerequisite Course Requirements	14
2.5 LAIS Courses.....	16
2.5.1 Rationale for LAIS Courses.....	16
2.5.2 Required HSS Courses.....	16
2.5.3 HSS Restrictions	16
2.6 Senior Design in MME	17
2.7 Senior Diagnostic Exams	17
2.8 Components of the MME Curriculum	18
3. Metallurgical and Materials Program Accreditation.....	19
3.1 Program Educational Objectives:	19
3.2 Student Outcomes:	19
4. Registration and the Registrar.....	20
4.1 Registration for Courses	20
4.1.1 General Registration Information	20
4.1.2 Registration for MME Courses	21
4.2 Registrar Forms.....	22
4.2.1 Registration Action Form	22
4.2.2 Course Substitution Request Form	23
4.2.3 Undergraduate Major/Advisor Change Form	23
4.2.4 Undergraduate Bulletin Change Form	24
4.2.5 Transfer Credit Approval Form	24
4.2.6 Independent Study (MTGN X99) Form	25
5. Other Opportunities	26
5.1 Internships and Summer Research Experience.....	26
5.2 Cooperative Education.....	26
5.3 Study Abroad	27
5.4 Field Trips.....	27
5.5 Research Opportunities within MME	27
5.6 CSMMAC (CSM Materials Advantage Chapter).....	28
5.7 Professional Societies for MME Majors.....	28
5.8 MME Scholarship Opportunities	29
5.9 Graduate School, Is It for You?	30

5.9.1 Choosing a graduate program	30
5.9.2 Preparing your graduate school application packet	30
5.9.3 Funding for graduate school	31
5.10 Access to the Computers and the Computer Room (HH251).....	31
Appendix A: CSM Student Honor Code and Policy on Academic Integrity/Misconduct	33

This Guide is intended for Metallurgical and Materials Engineering (MME) students. Its aim is to provide a single source of information with regard to the MME program and what you need to do in order to successfully navigate the Colorado School of Mines (CSM) bureaucracy with the minimum of pain and earn your MME degree. We also want you to be aware of the many opportunities that exist within our program that are outside of the classroom and laboratory. These opportunities can help you to develop other skills and talents that can be beneficial to you in your Materials career.

At CSM the MME department is located within the College of Applied Science and Engineering (CASE). Knowing that MME is within CASE can be helpful when you are searching for information from the CSM website. Various webpages (e.g. Courses in the online Bulletin, Academic Departments, etc.) are organized not by Department but by College, so you first need to locate the CASE link or section, and then you should find the MME link that you are seeking.

1. Academic and Professional Conduct

1.1 Academic Integrity

The Colorado School of Mines student Honor Code as well as expectations and policies with regard to academic integrity appear in the Bulletin. It is worth your effort to read this section of the Bulletin at least once a year. We do not want you to be surprised with our expectations or CSM policies in doing work as part of your degree program. The pertinent parts of the Bulletin have been copied to Appendix A. The faculty members in MME strongly support the statements on academic integrity in the Bulletin. We hope that you will adhere to the honor code and the policies so that everyone can grow as true scholars.

1.2 Engineering Professional Ethics

Since most of you will be practicing Engineers in a few years you should become familiar with Engineering Ethics. The Code below was adopted by the Accreditation Board for Engineering and Technology in 1977. The Code reads as:

Engineers uphold and advance the integrity, honor and dignity of the engineering profession by:

- I. using their knowledge and skill for the enhancement of human welfare;*
- II. being honest and impartial, and servicing with fidelity the public, their employers and clients;*
- III. striving to increase the competence and prestige of the engineering profession; and*
- IV. supporting the professional and technical societies of their disciplines.*

The Fundamental Canons

- 1. Engineers shall hold paramount the safety, health and welfare of the public in the performance of their professional duties.*
- 2. Engineers shall perform services only in the areas of their competence.*
- 3. Engineers shall issue public statements only in an objective and truthful manner.*
- 4. Engineers shall act in professional matters for each employer or client as faithful agents or trustees, and shall avoid conflicts of interest.*
- 5. Engineers shall build their professional reputation on the merit of their service and shall not compete unfairly with others.*

6. *Engineers shall act in such a manner as to uphold and enhance the honor, integrity and dignity of the profession.*
7. *Engineers shall continue their professional development throughout their careers and shall provide opportunities for the professional development of those engineers under their supervision.*

Other engineering societies have their own ethical codes. An excellent resource to learn more about engineering ethics is the website: www.onlineethics.org

2. MME Undergraduate Degree Program Requirements

The degree requirements for a Bachelor of Science in Metallurgical and Materials Engineering from Colorado School of Mines are summarized below.

2.1 Minimum Degree Requirements for Metallurgical and Materials Engineering

To qualify for a Bachelor of Science in Metallurgical and Materials Engineering degree from Colorado School of Mines, you must satisfy the following CSM general requirements:

1. A minimum cumulative grade-point average of 2.000 for all academic work completed in residence.
2. A minimum cumulative grade-point average of 2.000 for courses in MME (i.e. all MTGN courses).
3. A minimum of 30 hours credit in 300 and 400 series technical courses in residence, at least 15 of which are to be taken in the senior year.
4. A minimum of 19 hours in humanities and social sciences courses.
5. Recommendation of the MME department to the CSM faculty.
6. Certification by the Registrar that all required academic work is satisfactorily completed.
7. Recommendation of the CSM faculty and approval of the CSM Board of Trustees.

You have the responsibility to meet the first four requirements and to complete the required academic work listed below. The department and the school will handle the last three requirements and no action is needed on your part.

Seniors must submit an [Application to Graduate](#) upon completion of 90 hours (upon obtaining Senior class standing). Applications are completed online through the student's Trailhead account.

The Registrar's Office provides the service of doing preliminary degree audits. Ultimately, however, it is your responsibility to monitor the progress of your degree. It is also your responsibility to contact the Registrar's Office when there appears to be a discrepancy between the degree audit and your record. The Registrar's Office also provides on-line degree audits. To access the online degree audit, you need to go to:

Trailhead/Self Service/Student/Student Records/Degree Evaluation.

All graduating students must officially check out of the School. Checkout cards, available at Graduation Salute and in the Dean of Student's Office, must be completed and returned one week prior to the expected date of completion of degree requirements.

2.2 Metallurgical and Materials Engineering Course Work

The B.S. Curriculum in Metallurgical and Materials Engineering requires the following academic course work:

First Year

Fall Semester	lec.	lab.	sem.hrs.
MATH111 Calculus for Scientists & Engr's I	4		4
CHGN121 Principles of Chemistry I	3	3	4
GEGN101* Earth and Environmental Systems or BIOL110* Biology I	3	3	(4 or 4)
EPIC151* Design I	2	3	3
CSM101 Freshman Success Seminar	0.5		0.5
PAGN101 Physical Education I	0.5		0.5
Total			17

Spring Semester	lec.	lab.	sem.hrs.
MATH112 Calculus for Scientists & Engr's II	4		4
CHGN122 Principles of Chemistry II or CHGN 125 Molecular Engr and Materials Chemistry	3	3	(4 or 4)
PHGN100 Physics I	3.5	3	4.5
LAIS100* Nature and Human Values	4		4
PAGN102 Physical Education II		2	0.5
Total			16

* For scheduling purposes, registration in combinations of GEGN101, BIOL110, LAIS100, EBGN201, and EPIC151 will vary between the fall and spring semesters. Students admitted with acceptable advanced placement credits will be registered in accordance with their advanced placement status.

Sophomore Year Fall Semester	lec.	lab.	sem.hrs.
CHGN209 Introduction to Thermodynamics	3		3
MATH213 Calculus for Scientists & Engr's III	4		4
PHGN200 Physics II	3.5	3	4.5
MTGN202 Engineered Materials	3		3
PAGN2xx Physical Education		2	0.5
Total			15

Sophomore Year Spring Semester	lec.	lab.	sem.hrs.
MATH225 Differential Equations	3		3
Restricted Technical Elective*	3		3
CEEN241 Statics	3		3
EPIC251 Design II	2	3	3
EBGN201 Principles of Economics	3		3
LAIS200 Human Systems	3	3	
PAGN2xx Physical Education		2	0.5
Total			18.5

*Restricted Technical Electives

CBEN303 General Biology II	CHGN351	Physical Chemistry I
CEEN301 Fundamentals of Environmental Science I	EENG281	Introduction to Electrical Circuits
CSCI261 Programming Concepts	ENGY200	Introduction to Energy
CHGN221 Organic Chemistry I	MATH323	Probability and Statistics
CHGN335 Instrumental Analysis	MATH332	Linear Algebra
CHGN336 Analytical Chemistry	MATH348	Advanced Engineering Math
	PHGN215	Analog Electronics
	PHGN300	Modern Physics

Summer Session	lec.	lab.	sem.hrs.
MTGN272 Particulate Materials Processing			3
Total			3
Junior Year Fall Semester	lec.	lab.	sem.hrs.
MTGN311 Structure of Materials	3		3
MTGN311L		3	1
MTGN351 Metallurgical & Materials Thermodynamics	3		3
MTGN381 Phase Equilibria	2		2
CEEN311 Mechanics of Materials	3		3
LAIS/EBGN H&SS Elective I	3		3
Free Elective	3		3
Total			18
Junior Year Spring Semester	lec.	lab.	sem.hrs.
MTGN334 Chemical Processing of Materials	3		3
MTGN334L		3	1
MTGN348 Microstructural Develop of Materials	3		3
MTGN348L		3	1
MTGN352 Metallurgical & Materials Kinetics	3		3
LAIS/EBGN H&SS Elective II	3		3
Free Elective	3		3
Total			17
Senior Year Fall Semester	lec.	lab.	sem.hrs.
MTGN445 Mechanical Behavior of Materials	3		3
MTGN445L		3	1
MTGN450 Stat Process Control & Design of Expts	3		3
MTGN461 Trans. Phen. & Reactor Design for MME	2		2
MTGN461L		3	1
MTGN—MTGN Elective	3		3
LAIS/EBGN Elective III (400 level)	3		3
Total			16
Senior Year Spring Semester	lec.	lab.	sem.hrs.
MTGN415 Electronic Properties & Applications of Mats	3		3
MTGN466 Design, Selection & Use of Mats	1	6	3
MTGN—MTGN Elective	3		3
MTGN—MTGN Elective	3		3
MTGN—MTGN Elective	3		3
Free Elective	3		3
Total			18
Degree Total			138.5

2.3 Metallurgical and Materials Engineering Tracks

Beginning with the 2012/13 Bulletin, the MME department is offering elective tracks within four subfields of our discipline. You have the option to select one of these focus areas by pursuing one of four tracks. A track is not required to obtain a degree in Metallurgical and Materials Engineering. Only a single track can be taken as part of the degree. The track designation will only appear on the transcript and it does not appear on the diploma. To pursue a track, you must file appropriate paper work with the registrar. As strange as it seems, the paperwork you must fill out is an "[Undergraduate Major/Advisor Change](#)" form. You only need to fill out the first section of the form and circle the word MAJOR. You would be changing from MME to MME with track in XXX where XXX is one of the four tracks listed below. Although you are not really changing major, the registrar needs this type of paperwork since you will have a more restricted set of degree requirements as detailed below. Before graduation the registrar will check your course work against the more restricted set of requirements to certify that you have earned the BS in MME with a track in XXX. Once you fill out the paperwork, you will need to fulfill the curricular requirements for that track. After a track has been declared, you can change your track or return to the basic curriculum by submitting appropriate paperwork to the registrar. Again, the appropriate paperwork is the "[Undergraduate Major/Advisor Change](#)" form.

The four focus areas (tracks) in MME are:

1. Physical and Manufacturing Metallurgy
2. Ceramic and Electronic Materials
3. Physicochemical Processing of Materials
4. Biomaterials

Each track has four specific or track restricted courses that need to be taken. Only one of these four courses can be part of the standard MME degree course work. These specific or restricted courses are highlighted in the listings that follow. The restricted courses are listed as Track MTGN Electives and the restrictions are given at the bottom of each list.

For students who entered CSM prior to 2012, if you want to be recognized for a track you will need to petition to change to the 2012/2013 bulletin using the [Undergraduate Bulletin Change Form](#). By changing to this bulletin, you will need to meet the requirements for the degree that are listed therein.

2.3.1 MME Track -- Physical and Manufacturing Metallurgy

The first three years are the same as the MME degree listed previously.

Senior Year Fall Semester	lec.	lab.	sem.hrs.
MTGN445 Mechanical Behavior of Materials	3		3
MTGN445L		3	1
MTGN461 Trans. Phen. & Reactor Design for MME	2		2
MTGN461L		3	1
MTGN450 Stat Process Control & Design of Expts	3		3
Track MTGN Elective#	3		3
LAIS/EBGN H&SS Elective III (400 level)	3		3
Total			16
Senior Year Spring Semester	lec.	lab.	sem.hrs.
MTGN466 Design, Selection & Use of Mats	1	6	3
MTGN415 Electronic Properties & Applications of Mats	3		3
MTGN442 Engineering Alloys	3		3
Track MTGN Elective#	3		3
Track MTGN Elective#	3		3
Free Elective	3		3
Total			18
Degree Total			138.5

#Track MTGN Electives. Must be selected from the following courses:
 MTGN300/300L Foundry Metallurgy and Foundry Metallurgy Laboratory
 MTGN456/456L Electron Microscopy and Electron Microscopy Laboratory
 MTGN464/464L Forging and Forming and Forging and Forming Laboratory
 MTGN475/475L Metallurgy of Welding and Metallurgy of Welding Laboratory

Note: None of the four track courses are required in the standard MME degree.

2.3.2 MME Track -- Ceramic and Electronic Materials

The first three years are the same as the MME degree listed previously.

Senior Year Fall Semester	lec.	lab.	sem.hrs.
MTGN445 Mechanical Behavior of Materials	3		3
MTGN445L		3	1
MTGN461 Trans. Phen. & Reactor Design for MME	2		2
MTGN461L		3	1
MTGN450 Stat Process Control & Design of Expts	3		3
MTGN412 Ceramic Engineering	3		3
Restricted Track MTGN Elective##	3		3
Total			16
Senior Year Spring Semester	lec.	lab.	sem.hrs.
MTGN466 Design, Selection & Use of Mats	1	6	3
MTGN415 Electronic Properties & Applications of Mats	3		3
Track MTGN Elective#	3		3
MTGN—MTGN Elective	3		3
LAIS/EBGN H&SS Elective III (400 level)	3		3
Free Elective	3		3
Total			18
Degree Total			138.5

#Track MTGN Electives. Must be selected from the following courses:

- MTGN414 Processing of Ceramics
- MTGN 456/456L Electron Microscopy and Electron Microscopy Laboratory
- MTGN465 Mechanical Properties of Ceramics and Composites
- MTGN469 Fuel Cell Science and Technology
- CHGN410 Surface Chemistry
- PHGN419 Principles of Solar Energy Systems
- PHGN435 Interdisciplinary Microelectronics Processing Laboratory

##Restricted Track MTGN Elective. Must be selected from the following courses:

- MTGN414 Processing of Ceramics
- PHGN435 Interdisciplinary Microelectronics Processing Laboratory

Note: The track course MTGN415 is required for the MME degree

2.3.3 MME Track -- Physicochemical Processing of Materials

The first three years are the same as the MME degree listed previously.

The junior year course **MTGN334 Chemical Processing of Materials** is the fourth course required for this track.

Senior Year Fall Semester	lec.	lab.	sem.hrs.
MTGN445 Mechanical Behavior of Materials	3		3
MTGN445L		3	1
MTGN461 Trans. Phen. & Reactor Design for MME	2		2
MTGN461L		3	1
MTGN450 Stat Process Control & Design of Expts	3		3
Track MTGN Elective#	3		3
Track MTGN Elective#	3		3
Total			16
Senior Year Spring Semester	lec.	lab.	sem.hrs.
MTGN466 Design, Selection & Use of Mats	1	6	3
MTGN415 Electronic Properties & Applications of Mats	3		3
Track MTGN Elective#	3		3
MTGN—MTGN Elective	3		3
LAIS/EBGN H&SS Elective III (400 level)	3		3
Free Elective	3		3
Total			18
Degree Total			138.5

#Track MTGN Electives. Must be selected from the following courses:

- MTGN430 Physical Chemistry of Iron and Steelmaking
- MTGN431 Hydro- and Electro-Metallurgy
- MTGN432 Pyrometallurgy
- MTGN532 Particulate Materials Processing I
- MTGN533 Particulate Materials Processing II

Note: The track course MTGN334 is required for the MME degree.

2.3.4 MME Track -- Biomaterials

The first three years are the same as the MME degree listed previously.

Senior Year Fall Semester	lec.	lab.	sem.hrs.
MTGN445 Mechanical Behavior of Materials	3		3
MTGN445L		3	1
MTGN461 Trans. Phen. & Reactor Design for MME	2		2
MTGN461L		3	1
MTGN450 Stat Process Control & Design of Expts	3		3
MTGN472 Biomaterials I	3		3
Track MTGN Elective#	3		3
Total			16
Senior Year Spring Semester	lec.	lab.	sem.hrs.
MTGN466 Design, Selection & Use of Mats	1	6	3
MTGN415 Electronic Properties & Applications of Mats	3		3
MTGN463 Polymer Engineering	3		3
MTGN570 Biocompatibility	3		3
LAIS/EBGN H&SS Elective III (400 level)	3		3
Free Elective	3		3
Total			18
Degree Total			138.5

#Track MTGN Elective. Must be selected from the following courses:

- MTGN412 Ceramic Engineering
- MTGN451 Corrosion Engineering

Note: None of the four track courses are required in the standard MME degree.

2.4 MME Curriculum Flowchart

The MME department has developed a flow chart to help you monitor your progress towards your degree. A copy of the flowchart can be obtained from the MME departmental website under the undergraduate program. The title of the flowchart is [2014/2015 MME Undergraduate Program](#). In essence the general MME curriculum has not changed since 2010, but a number of course designations have change and a few tweaks have been implemented. These small changes are reflected in the current flowchart: August 2015. If you need a flowchart for prior years, please contact the Associate Department Head (Prof. Van Tyne).

A copy of that flowchart appears on the next page. It uses lines and arrows to show the prerequisite courses. Because of a variety of circumstances, most students will not follow the flowchart exactly as given. Examples are: 1) the registrar may have assigned your first semester courses different than listed, 2) you transferred into MME during the second year and have taken a different set of courses, 3) you took a free elective during your second year and took CEENN241 Statics your first semester junior year, etc. There is no problem in completing your degree with variations as long as you have the proper prerequisites before taking a course and you pass all courses on the flowchart.

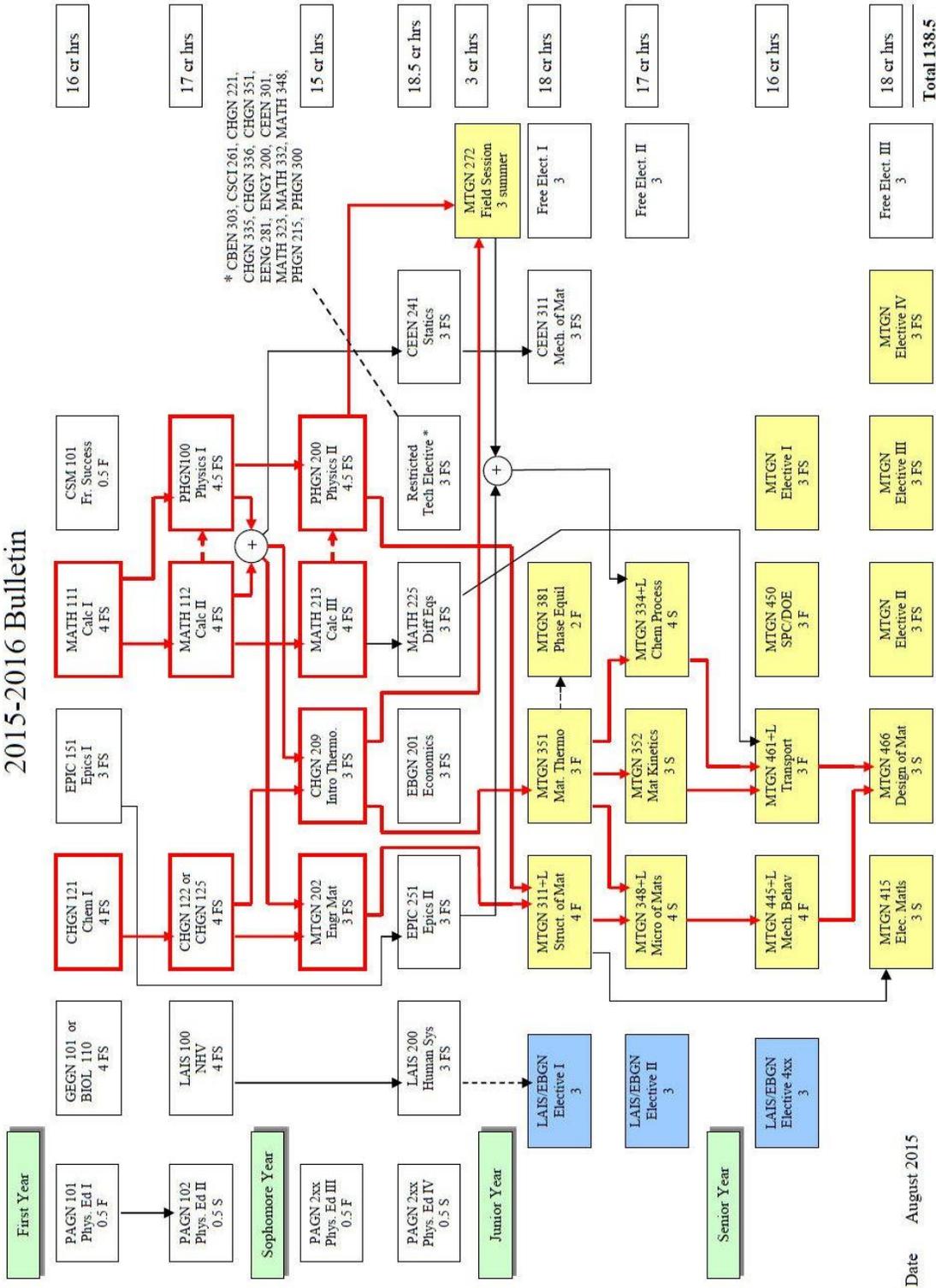
2.4.1 Caution about Prerequisite Course Requirements

For those students who are considering completing their degree in nine semesters, be very careful with the critical path that exists in the curriculum. The critical path is shown on the flowchart by the red lines. By the start of field session (MTGN272) you must have completed the following chemistry, mathematics and physics courses: CHGN121, CHGN122/CHGN125, CHGN209, MATH111, MATH112, MATH213, PHGN100, PHGN200, as well as the introduction to materials: MTGN202.

To finish the MME degree in either 4 or 4.5 years, you will need to complete MTGN466 and MTGN 415 in your eighth semester since they are only offered during the spring. You will need to complete MTGN445/445L and MTGN461/461L by your seventh semester since they are only offered in the fall and they are prerequisites for MTGN466. You will need to complete MTGN334/334L, MTGN348/348L and MTGN352 by your sixth semester since they are only offered in the spring and they are prerequisites for MTGN445 and MTGN461. You will need to complete MTGN311 and MTGN 351 in your fifth semester. MTGN272 will need to be completed during the summer between Sophomore and Junior year. This critical path is indicated by the red lines in the flowchart. Be very careful about knowing the prerequisite(s) for courses. The reason for prerequisite courses is so the material presented will be at a higher level and will be built upon the foundation of prior coursework. Not having completed the prior prerequisite course(s) will put you at a major disadvantage and is not recommended except in rare, special circumstances.

Course Flow Chart for Metallurgical and Materials Engineering

2015-2016 Bulletin



2.5 LAIS Courses

2.5.1 Rational for LAIS Courses

The rational for LAIS courses is contained in the Bulletin. It reads in part

As the 21st century unfolds, individuals, communities, and nations face major challenges in energy, natural resources, and the environment. While these challenges demand practical ingenuity from engineers and applied scientists, solutions must also take into account social, political, economic, cultural, ethical, and global contexts. CSM students, as citizens and future professionals, confront a rapidly changing society that demands core technical skills complemented by flexible intelligence, original thought, and cultural sensitivity.

Courses in Liberal Arts and International Studies (LAIS) expand students' professional and personal capacities by providing opportunities to explore the humanities, social sciences, and fine arts. Our curricula encourage the development of critical thinking skills that will help students make more informed choices as national and world citizens - promoting more complex understandings of justice, equality, culture, history, development, and sustainability. Students study ethical reasoning, compare and contrast different economies and cultures, develop arguments from data, and interrogate globalization. LAIS courses also foster creativity by offering opportunities for self-discovery. Students conduct literary analyses, improve communication skills, play music, learn media theory, and write poetry. These experiences foster intellectual agility, personal maturity, and respect for the complexity of our world.

2.5.2 Required HSS Courses

Two of three required undergraduate core courses in the Humanities and Social Sciences are delivered by LAIS, namely, LAIS100, Nature and Human Values; and LAIS200, Human Systems. The third HSS core course, EBGN201, Principles of Economics, is delivered by the Division of Economics & Business.

Beyond the core, LAIS offers the majority of the courses that meet the 9 credit-hour Humanities and Social Science (HSS) requirement. The Division of Economic and Business also offers courses that may be used to meet the HSS requirement.

The courses that meet the LAIS/EBGN Elective requirements can be found on the LAIS website at: lais.mines.edu/LAIS-HSS-Requirements

2.5.3 HSS Restrictions

Music (LIMU)

Courses in Music do not count toward the Humanities & Social Sciences General Education restricted elective requirement, but may be taken for Free Elective credit only. A maximum of 3.0 semester hours of concert band, chorus, physical education, athletics or other activity credit combined may be used toward free elective credit in a degree granting program.

Foreign Language (LIFL)

Four foreign languages are taught through the LAIS Division. In order to gain basic proficiency from their foreign language study, students are encouraged to enroll for at least two semesters in whatever language(s) they elect to take. No student is permitted to take a foreign language that is either his/her native language or second language.

LAIS Minors

At the undergraduate level, LAIS offers minors in Literature, Society, and the Environment; International Political Economy; Science, Technology, Engineering, and Policy; Humanitarian Engineering; and an Individualized Undergraduate minor. See the minor tab for details. LAIS also is the home for the minor in the McBride Honors Program in Public Affairs.

If you are a graduating senior and are locked out of all LAIS 400 level courses and you need the course to graduate that semester, please see your Advisor or the Associate Department Head (Prof. Van Tyne) as soon as possible to discuss options.

2.6 Senior Design in MME

MTGN466 is the culminating design course for the MME program. This course is only offered during the spring of each year. Prof. Anderson and Prof. Bourne will organize this course for Spring 2016, but other faculty members within the MME department or someone outside the department may propose the project you work on. To properly prepare for the class, Prof. Anderson and Prof. Bourne will gather project titles and descriptions early in the fall semester. They will then poll you to determine your interest in the various proposed projects. From this polling, they will organize the class into teams and assign each team to a project. This organization and assignment is done during the fall semester so that you can properly prepare during the winter break and start working on your project when you return to campus in January. The project will finish with a major presentation and a report.

2.7 Senior Diagnostic Exams

During MTGN466 there will be various diagnostic exams given to help the MME faculty understand the knowledge you have gained, but more importantly to help us learn how we can improve our program and better prepare students for careers in Metallurgical and Materials Engineering. These exams are a critical part of the MME assessment process for our program. Although the results are not reflected directly in your MTGN466 grade, we hope that you take the tests seriously so that we can continue to improve the program.

2.8 Components of the MME Curriculum

The various courses in our program can be grouped into one of 6 categories

	Credit Hours
1. Mathematics and Basic Science	39
2. Engineering Core	15
3. Metallurgical and Materials Engineering Core	51
4. General Education	19
5. Free Electives	9
6. Other	5.5
Total Hours	138.5

It should be noted that the MME Core courses contain both engineering topics as well as mathematics and advanced science topics.

A tabular breakdown of how these courses distribute over these groups is shown below.

	First Yr Fall	First Yr Spring	Soph. Fall	Soph. Spring	Soph. Summer	Jr. Fall	Jr. Spring	Sr. Fall	Sr. Spring
Math & Basic Science	GEGN101 or BIOL110 CHGN121 MATH111	CHGN122 or CHGN125 PHGN100 MATH112	CHGN209 PHGN200 MATH213	MATH225 Tech El.*					
Engr. Core	EPIC151		MTGN202	EPIC251 CEEN241		CEEN311			
MME Core					MTGN272	MTGN311 MTGN351 MTGN381	MTGN334 MTGN348 MTGN352	MTGN445 MTGN450 MTGN461 MT Elec.	MTGN415 MTGN466 MT Elec. MT Elec.
General Educ.		LAIS100		LAIS200 EBGN201		HSS Elec.	HSS Elec.	HSS Elec.	
Free Electives						3 Credits	3 Credits		3 Credits
Other	PAGN101 CSM101	PAGN102	PAGN201	PAGN202					

* Could be part of Engr. Core depending on what course you select.

3. Metallurgical and Materials Program Accreditation

The program leading to the degree Bachelor of Science in Metallurgical and Materials Engineering is accredited by the Engineering Accreditation Commission of the ABET <http://www.abet.org>.

3.1 Program Educational Objectives:

Program educational objectives are broad statements that describe what graduates are expected to attain within a few years of graduation. The Metallurgical and Materials Engineering program at CSM prepares graduates who:

1. obtain a range of positions in industry or positions in government facilities or pursue graduate education in engineering, science, or other fields;
2. demonstrate advancement in their chosen careers;
3. engage in appropriate professional societies and continuing education activities.

3.2 Student Outcomes:

Student outcomes describe what students are expected to know and be able to do by the time of graduation. The student outcomes for the Metallurgical and Materials Engineering program are:

- (a) an ability to apply knowledge of mathematics, science, and engineering
- (b) an ability to design and conduct experiments, as well as to analyze and interpret data
- (c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
- (d) an ability to function on multidisciplinary teams
- (e) an ability to identify, formulate, and solve engineering problems
- (f) an understanding of professional and ethical responsibility
- (g) an ability to communicate effectively
- (h) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
- (i) a recognition of the need for, and an ability to engage in life-long learning
- (j) a knowledge of contemporary issues
- (k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

The Metallurgical and Materials Engineering (MME) program emphasizes the structure, properties, processing and performance of materials.

4. Registration and the Registrar

In order to complete the course requirements, you must register for, take, and pass the courses listed in the MME curriculum. While the registration process is fairly straightforward, each student is unique and your circumstances may require special attention.

In spite of the relatively small size of CSM and of the MME department, there is often a significant amount of paperwork that needs to be completed in order to handle course registration and curricular matters. In order to minimize your hassle we are providing a listing of the most common documents that you may need in dealing with these issues. These documents need to be in place in order for you to be able to register for courses when you are blocked or to insure that the courses you are/have taken are properly recognized by the Registrar so that certification of degree requirements can be done.

4.1 Registration for Courses

4.1.1 General Registration Information

Registration occurs online using the Trailhead/Banner system. Designated registration weeks occur about the 11th week of each semester allowing you to register in advance for the upcoming semester. The registration sequence is determined by the Registrar, with athletes and special students having preference, followed by Seniors, Juniors, Sophomores and First Year students on subsequent days. Within each group the registration time slots are randomly assigned based on the beginning letter of your last name. The [Registrar's Office](#) publishes the days and times on their website.

As a MME student, you will only need a personal identification number (PIN) to register if your overall grade point average is 3.00 or below. If your GPA is above 3.00 you are automatically eligible to register with no PIN required. To obtain your PIN, if required, you must contact your Advisor. The Associate Department Head (Prof. Van Tyne) also has copies of PINs and he can be contacted if your Advisor is not available. You are encouraged to prepare a plan for registration in advance and to meet with your advisor on a regular basis to review your academic progress.

It is important that you make sure there are no "Holds" on your account, as they can adversely affect your ability to register and may prevent you from getting the course/section you desire. The most common reason for a Hold is a deficit in your financial account due to tuition, fees or fines (parking tickets are notorious in holding up students from registering). Be sure that your account is clear, as you will want to register as early as possible.

The courses for the MME degree do not have a great deal of flexibility until your senior year, nevertheless it would be good to discuss your course selection with your Advisor. This discussion can occur by a face-to-face meeting or by email. If your Advisor is not readily available discussions can occur with the Associate Department Head (Prof. Van Tyne).

4.1.2 Registration for MME Courses

There are several special circumstances with regard to MME courses that you should be aware of.

CHGN122 vs CHGN125. Either course is acceptable for the MME degree. If you are interested in extractive metallurgy or mineral processing then CHGN122 would be more suitable. If you are interested in physical metallurgy, ceramics, biomaterials, electronic materials or plastics then CHGN125 would be more suitable. The Associate Department Head (Prof. Van Tyne) can be consulted for appropriate guidance if you are uncertain.

MTGN202. If the course is full and you are an MME student please see the Associate Department Head (Prof Van Tyne) to take care of the issue.

EPIC251. Any version of Epics II is acceptable for the MME degree. Paperwork may be needed to convince the registrar's office that you have fulfilled the degree requirement if you have taken a version of Epics II different from EPIC251.

During the spring semester there is a special section of Epics II (EPIC271 Materials) that is focused on Materials. You are encouraged to register for that section.

MTGN 300 and 400 level courses. If a MTGN lecture course is closed please see the Department Program Assistant (Erin Stoll) or the Associate Department Head (Prof Van Tyne) to discuss the issue. We will work with you to find an appropriate solution.

MTGN Lab Sections. Due to safety concerns and educational benefits, the laboratory sections are restricted in size. We cannot guarantee that you will get the lab section on your preferred day or time. If you have a strong preference for a particular section, please register early. If you have a major conflict that cannot be resolved with the course instructor(s) please see the Associate Department Head (Prof Van Tyne) to discuss the issue.

MTGNX99 Independent Study Courses. These courses need special paperwork and the description of what these courses entail and the paperwork needed are described below.

4.2 Registrar Forms

The MME Department Office and the MME website have copies of various forms that are needed in dealing with the Registrar's office. These forms can also be obtained from the Registrar's office, but you may need to wait in line to get some of them, so use the website of the MME office to minimize wasting time. The various forms available include:

[Registration Action Form](#)

[Course Substitution Request Form](#)

[Undergraduate Major/Advisor Change Form](#)

[Undergraduate Bulletin Change Form](#)

[Transfer Credit Prior/Post Approval Form Undergraduate](#)

[Independent Study \(MTGN X99\) Form](#)

4.2.1 Registration Action Form

The [Registration Action Form](#) is a general purpose form for a large variety of actions that may be needed to get you into a course. If you do not meet the requirements for a course the computer registration will have a code that blocks you from selecting the course as part of your schedule. Submission of this signed form will override the blocking code and permit you to register for the course. You must complete some basic information and sign the top of the form.

The code overrides that this form is used for are:

Registering for a CLOSED course with no waitlist

Waving a PREREQUISITE so you can register for a course

Registering for a course that has a TIME conflict with another class you will take

Registering to AUDIT a course for no credit

Registering for a course that requires a specific MAJOR which is not your major

Registering for a course that requires the CONSENT of the instructor

Registering for a course that requires Jr or Sr CLASS standing before you reach that level

In all of these cases you will need to get the signature of the instructor for the course you are trying to take in order to override the computer blocking code and permit you to register.

The bottom part of the form can be used to override the restriction of 19 hours maximum credit hours you are permitted to take in one semester. Registering for more than 19 hours will cost extra tuition. This part of the form does not require a faculty member's signature only your initials indicating that you understand extra tuition will be charged to your account. It would be advisable to discuss this overload with your Advisor before you submit the form and register for more than 19 hours in one semester.

Submission of a signed form to the Registrar does not get you registered. The Registrar's office will only change the computer blocking code so that you are permitted to register. You still will need to register for the course after the form has been submitted. We strongly recommend that you make and retain a copy of the signed form before submitting it to the Registrar's office.

Signatures required: 1) **Yours** and 2) **Instructor** of the course.

4.2.2 Course Substitution Request Form

The [Course Substitution Request Form](#) is used to substitute a different course for a required course in the MME program. At times it may be in your best educational interest to substitute one course for another. This substitution needs to be carefully considered and the rationale for the substitution needs to be supplied.

The top part of the form requires some basic information, your signature and the cogent rationale for the substitution. The middle part of the form requires signatures from the department head of the course you plan or have taken and the department head from the required course that you will not be taking. If both courses are in the same department then that department head will need to sign in both places. The form also requires the signature of your Advisor and the signature of the MME Department Head (Prof. Reimanis) or Associate Department Head (Prof. Van Tyne). The signed form must be delivered to the Registrar's office. We strongly recommend that you make and retain a copy of the signed form before submitting it to the Registrar's office.

Signatures required: 1) **Yours**, 2) **Department Head** for the course you took or plan to take, 3) **Department Head** for the required course you will not take, 4) your **Advisor**, and 5) **MME Department Head** (Prof. Reimanis or Prof. Van Tyne)

4.2.3 Undergraduate Major/Advisor Change Form

The [Undergraduate Major/Advisor Change Form](#) is used to obtain an advisor in MME, change your MME advisor, change your major to MME or to apply for one of the MME tracks. It can also be used to change your major to something other than MME but we would prefer that you discuss this change out of MME with your Advisor before doing so. The form can also be used to request a double major. If you are interested in a double major please consult your Advisor and the Undergraduate Bulletin for details.

The top part of the form requires some basic information. You must check the change of Major/Advisor box and circle either MAJOR or ADVISOR or both. You need to indicate the Major and Advisor and Department you are leaving and the Major and Advisor and Department you are entering.

For those applying for a Track in MME you would indicate that your "old" Major is MME and "new" Major is MME with Track in XXX (where XXX is the name of one of the four tracks). It would be good for you to discuss your desire to do an MME Track with your Advisor before completing and submitting this form. You will need to sign the form and you need to obtain the signature of the Departmental Program Assistant (Erin Stoll). She can also provide help and guidance for obtaining an appropriate MME Advisor. Once the form is completed and signed it needs to be submitted to the Registrar's office. We strongly recommend that you make and retain a copy of the signed form before submitting it to the Registrar's office.

Signatures required: 1) **Yours** and 2) **MME Program Assistant** (Erin Stoll)

4.2.4 Undergraduate Bulletin Change Form

The [Undergraduate Bulletin Change Form](#) is used to change from the requirements of one bulletin to another. You must meet the requirements of the Bulletin that you entered with. For example if you started CSM in the fall of 2012 or the spring of 2013 you are must meet the requirements listed in the 2012/2013 Undergraduate Bulletin. You are allowed to change to a newer Bulletin (e.g. 2013/2014) but not to an older Bulletin (e.g. 2011/2012). You are allowed to switch back to your original Bulletin but not an earlier one. A reason to consider such a switch is if the MME or CSM faculty have modified the curricular requirements for the MME degree then it may be in your best educational interest to change to the new Bulletin and the new degree requirements.

The top part of the form requires some basic information. You must then complete a statement giving 1) your name, 2) the Bulletin you are leaving, 3) the Bulletin you want to use, 4) your Major (i.e. MME or MME with Track XXX) and 5) a cogent rational why you want to make the change. You must also give your planned graduation date. You will need to sign the form as well as your Advisor and the MME Department Head (Prof. Reimanis) or Associate Department Head (Prof. Van Tyne). The form is submitted to the Registrar's office. We strongly recommend that you make and retain a copy of the signed form before submitting it to the Registrar's office.

Signatures required: 1) **Yours**, 2) your **Advisor**, and 3) **MME Department Head** (Prof. Reimanis or Prof. Van Tyne)

4.2.5 Transfer Credit Approval Form

The [Transfer Credit Pre/Post Approval Form](#) is to obtain credit for courses that you have taken outside of CSM. It is strongly advised to obtain approval for these transfer credits prior to taking the course. Post approval can be obtained but it is not guaranteed. It is far better to get approval prior to taking the course at another institution. Many of the departments at CSM are very strict about transfer credits and post approval requests are often denied by the department that offers the CSM equivalent course. You will need to earn a grade of C or better for the credits to transfer

The top part of the form requires some basic information about you. You then provide information about the course outside of CSM that you are transferring in. Next is the equivalent course at CSM that you want to get credit for. You must supply the reason for transferring these credits. You will need to get the signature of the Department Head that offers the equivalent CSM course. The MME Department Head (Prof. Reimanis) or Associate Department Head (Prof. Van Tyne) also needs to sign. Note there is extra post approval signature required for Physics courses. Also a different form is used for LAIS100, SYGN200 and LAIS cluster courses. You need to submit the signed form to the Registrar's office. We strongly recommend that you make and retain a copy of the signed form before submitting it to the Registrar's office. You must also have the non-CSM institution send an official transcript of your grades to the Registrar's office.

Signatures required: 1) **Department Head** for CSM equivalent course and 2) **MME Department Head** (Prof. Reimanis or Prof. Van Tyne).

4.2.6 Independent Study (MTGN X99) Form

The [Independent Study \(MTGN X99\) Form](#) is used to allow you to register for an independent study course working with a MME Faculty Member. The CSM Bulletin describes the MME independent study courses as:

Independent work leading to a comprehensive report. This work may take the form of conferences, library, and laboratory work. Choice of problem is arranged between student and a specific department faculty-member. Prerequisite: Selection of topic with consent of faculty supervisor; "Independent Study Form" must be completed and submitted to Registrar. 1 to 3 semester hours. Repeatable for credit.

Independent study would allow you to obtain credit for academic work that is done outside of the normal course offerings. It is a special program that needs to be discussed with an appropriate MME Faculty Member before submission of the form. The MME Faculty Member, who is considered the Instructor for this independent study course, does not need to be your academic Advisor. For the course to be an MTGN course it must be a Faculty Member within the MME department.

There is additional paperwork that needs to be completed along with this form in order to register for the independent study course. This additional document is a [Plan of Study Agreement](#). An example of a plan of study agreement is given on the MME website under the Undergraduate section. The example is in Word format and can be downloaded and modified to fit the plan that you are proposing. The plan of study agreement outlines 1) the work to be done, 2) the hours that will be involved, 3) the grading process, 4) expected due dates and 5) contents of the deliverables. It needs to be signed by you, the Instructor for the course and the MME Department Head. It must be completed before the Registrar's form is submitted. A copy of this agreement is retained in the MME department office and it will be used if there is ever a dispute on the outcome of your independent study course. You do not submit a copy of the agreement plan to the Registrar, it is only retained in the MME office. You should make two copies of the signed plan. Retain a copy for your records and one copy for the course instructor.

The Registrar's form (actually titled: Independent Study Registration Form) requires basic information about you and the course. The course number 199, 299, 399, or 499 depends on your current class level. 199 is for first year students, 299 for sophomores, 399 is for juniors and 499 is for seniors. (599 is for graduate students who use the same Registrar's form for their independent study courses). The course title needs to be 30 characters or less (including spaces) so that it will fit into the Registrar's computer system. You will need to sign the form have the instructor for the independent study course sign the form and the MME Department Head (Prof. Remanis) will need to sign the form. You then submit the form to the Registrar's office. Unlike registration action form, by submitting this form to the Registrar you will become registered in the appropriate course. We strongly recommend that you make and retain a copy of the signed form before submitting it to the Registrar's office.

Signatures required on the Study Plan and on the Independent Study Form: 1) **Yours**, 2) **MME Faculty Member** who will be the Instructor for the course, 3) **MME Department Head** (Prof. Reimanis).

5. Other Opportunities

This section describes other opportunities that exist for you in the MME department and program.

5.1 Internships and Summer Research Experience

It is important that you experience Metallurgical and Materials Engineering outside of the classroom either in an industrial or research setting. Although the MME department does not require an industrial or research internship, it is an experience that would serve you well as you begin your professional career in MME. Summer is a particularly good time for an internship in industry or university or National Laboratory. The department and the faculty often get inquiries from companies and universities seeking MME interns. Emails about these inquiries will be distributed to all of the MME students on the MME undergraduate mailing list. The CSM [Career Center](#) also has requests from companies seeking summer interns. You should consult their website and take advantage of the guidance that they can provide.

Research Experiences for Undergraduates (REU) are available at a number of universities. Many materials related REUs are sponsored by the National Science Foundation ([NSF](#)). A number of other Materials related REUs are associated with Materials Research Science and Engineering Centers ([MRSEC](#)). If you are accepted into one of these programs you would be paid for the 10 weeks of work and would have the opportunity to do research under the direction of a faculty member. At CSM there has been one materials related REUs. It is focused on [renewable energy](#). Opportunities abound for students in these programs, but you will need to do some work to learn about them and to meet the application requirements.

5.2 Cooperative Education

Cooperative Education (Co-op) is a formal means by which you can take a semester and work at a job in industry. It helps you integrate theory and practice, confirm career choices, investigate potential job opportunities, and become better graduates. At the same time, it allows you to earn money and help finance your education.

Within the MME department the Co-op is handled through the course MTGN340. The description of this course is:

*Supervised, full-time, engineering-related employment for a continuous six-month period (or its equivalent) in which specific educational objectives are achieved.
Prerequisite: Second semester sophomore status and a cumulative grade-point average of at least 2.00. 1 to 3 semester hours. Cooperative education credit does not count toward graduation except under special conditions. Repeatable.*

Details, answers to questions and a brochure about Co-op are available at the [Career Center Co-op](#) page. Prof. Mishra is the faculty liaison and he should be consulted if you are considering having a Co-op experience. There is also a liaison at the Career Center that needs to be consulted.

Because of the very structured nature of the MME program at CSM it can be difficult to do a Co-op and remain on track to graduate in a timely fashion. Some students have found it beneficial to do a Co-op followed by a Study Abroad in back to back semesters.

5.3 Study Abroad

In recent years a number of MME students have been spending a semester or a year overseas via the Study Abroad Program. You can learn more about CSM's Study Abroad Program in general by visiting the [Office of International Programs](#) (OIP) website. We would like to provide information to help you prepare for Study Abroad. Below are some general comments about Study Abroad.

- **Start your preparations as early as possible!** Typically students take Study Abroad during their junior year, but some go as early as their sophomore year or as late as their next to last semester before graduating. Virtually all students deviate from the standard MME flowchart, so advanced planning is necessary to determine which courses should be taken earlier, which should be delayed, and which courses can be transferred into CSM. OIP can provide help and guidance in arranging your program. It would be best to use their services.
- We feel that Study Abroad enhances your education, and we would like to help you in your plan to Study Abroad. Consultation with your Advisor and the Associate Department Head (Prof. Van Tyne) is strongly recommended so that you do not significantly delay your graduation date.
- In general, it is easier to satisfy basic courses and free electives than MME Core Courses during Study Abroad. LAIS courses should be easier to transfer but that is not always the case.
- Courses from Study Abroad locales must be approved for CSM credit using the [Transfer Credit Approval Form](#).

5.4 Field Trips

Traditionally, the students in MME have the opportunity to go a number of field trips to see industrial operations during the course of their studies. In field session (MTGN272) there are often trips to the Henderson Mine, Coors Ceramics and other local industries.

Just prior to the start of the fall semester in the senior year ArcelorMittal has provided an opportunity of the CSM MME students to visit and tour their facilities in East Chicago, IN.

Other courses (e.g. MTGN464L or MTGN475L) will often have a field trip in place of a formal lab during the semester. CSMMAC (see below) also organizes field trips to a number of operations during the academic year. These trips allow you to learn more about metallurgical and material processes and industries that use the principles that we cover in classes.

5.5 Research Opportunities within MME

The graduate and research activities within MME are a loose confederation of Research Centers. The five major Centers (and their directors) are:

- [ASPPRC](#) - Advanced Steel Processing and Products Research Center (Prof. Speer)
- [CANFSA](#) - Center for Advanced Non-Ferrous Structural Alloys (Prof. Kaufman)
- [CWJCR](#) - Center for Welding, Joining and Coatings Research (Prof. Liu)
- [CCAC](#) - Colorado Center for Advanced Ceramics (Prof. Reimanis)
- [KIEM](#) - Kroll Institute of Extractive Metallurgy (Prof. Taylor)

If you have interest in performing research as part of your undergraduate studies, it would be best to contact the director of the Center in which you have interest. Often these research activities are paid (especially if you have work study support). Initially, you would be doing mundane type of work but as your skills in the lab increase so will your responsibilities. By senior year a number of students work on their own independent small research program.

If you would prefer to obtain appropriate academic credit for research activities in lieu of pay (department policy allows you to either get credit or get paid but not both at the same time), you can consider doing the work as an Independent Study (MTGNX99) class or even possibly as a senior thesis (see MTGN403 Senior Thesis in the Bulletin and discuss with the Associate Department Head, Prof. Van Tyne)

5.6 CSMMAC (CSM Materials Advantage Chapter)

The CSM Materials Advantage Chapter (CSMMAC) formerly called the Materials Science and Engineering Club (MSEC) is an umbrella student chapter representing the major professional organizations in materials. These organizations are:

Material Advantage including:

- AIST (Association of Iron and Steel Technology)
- ACerS (American Ceramics Society)
- ASM International (The Materials Information Society)
- TMS (The Minerals, Metals and Materials Society)

Also,

- AWS (American Welding Society)
- NACE International (The Corrosion Society)

CSMMAC organizes presentations by outside industrial speakers (often with food), field trips to various local companies, barbeques for the MME department, a winter party for the department, and various other activities to serve the students in MME. The club also promotes student participation in national professional society activities such as conferences. All of the officers are MME students and the club normal receives some funding from ASCSM to promote and support their activities. Please see Prof. Findley or Prof. Bourne for more details about CSMMAC.

5.7 Professional Societies for MME Majors

There are a variety of professional societies that work on behalf of Metallurgical and Materials Engineering. Because of the diversity of our field, it is not too surprising that we have a diverse set of organizations. It is almost impossible and would be very expensive for a student to join all of the materials societies. As such, a group of societies have joined together to form the "[Material Advantage Student Program](#)". By joining the national Material Advantage you would have access to four major professional societies:

- [ACerS](#) - The American Ceramic Society
- [AIST](#) - Association for Iron & Steel Technology
- [ASM International](#) - The Materials Information Society
- [TMS](#) - The Minerals, Metals and Materials Society

The Material Advantage website provides details and access to the application. These four societies also organize a yearly fall conference call MS&T - Materials Science and Technology. MME students have frequently attended this meeting. In addition TMS organizes an Annual Meeting during the spring semester. MME students from CSM have been active participants in this meeting and have competed and won the [Materials Bowl](#) several times. Please see Prof. Findley or Prof. Bourne if you need more details about Material Advantage.

Other national societies that some our students have found beneficial include:

- [APMI International](#) - International Powder Metallurgy Institute
- [AWS](#) - American Welding Society
- [EDFAS](#) - Electronic Device Failure Analysis Society (ASM Affiliate)
- [HTS](#) - Heat Treating Society (ASM Affiliate)
- [IMS](#) - International Metallographic Society (ASM Affiliate)
- [MRS](#) - Materials Research Society
- [MSA](#) - Microscopy Society of America
- [NACE International](#) - The Corrosion Society
- [SME](#) - Society for Mining, Metallurgy and Exploration
- [SMST](#) - International Organization on Shape Memory and Superelastic Technologies (ASM Affiliate)
- [TSS](#) - Thermal Spray Society (ASM Affiliate)

These additional societies are more specialized. If your interest falls in one of these areas, you might consider joining that society in addition to the Material Advantage. As you can see our field is very diverse.

Many of these professional societies have divisions where the focus is on a smaller subset of materials or materials processing. Most of these societies have student memberships available. If you have interest in one of these fields, it would be beneficial to explore their website and see if joining would be worthwhile.

MME students also actively participate in three local professional societies on a regular basis. These societies are:

[Rocky Mountain Chapter of ASM International](#) (see Prof. DeMoor for details)

SME Colorado (see Prof. Anderson for details)

Extractive Metallurgy Society of Denver (see Prof. Taylor for details)

5.8 MME Scholarship Opportunities

There are a number of materials related scholarships for students in MME. It may take a bit of effort on your part to find them, learn about them and apply for them, but they can provide you and your family with some nice financial support towards your education. When scholarship opportunities come to the MME department they are sent to all students via the mailing list that is maintained by the computer center. If you are listed as an MME major (an important reason to submit the Change of Major Form to the Registrar) you will automatically be included on this mailing list.

Scholarships that are associated with technical and professional societies can be found on the web. Some examples are:

- [Material Advantage Scholarships](#) (for AIST, ASM, ACerS, TMS and others)
- [AIST Specific Scholarships](#)
- [AWS Specific Scholarships](#)
- [FIERF \(forging\) Specific Scholarships](#)
- [NACE Specific Scholarships](#)
- [SME Specific Scholarships](#)
- [TMS Specific Scholarships](#)

As you can see many of the professional societies in materials have scholarship opportunities. The MME faculty would be please to write any necessary letters of recommendations for these scholarships; all you need to do is ask. CSM is well respected within the materials community and people know the quality of education that you would receive in the MME program. So, with a little effort on your part, you can likely secure one of these scholarship awards.

5.9 Graduate School, Is It for You?

Do you have aspirations for an advanced degree? If you have not considered this option, perhaps you should. You are enrolled in a top program in the field of Metallurgical and Materials Engineering. If you have the desire to pursue a graduate degree, you should not let many of the misconceptions often held by undergraduates, deter you from graduate school. Lack of confidence often prevents undergraduates from seeking a higher degree. If you have a grade point average (GPA) of 3.0 or higher, and you scored a 1200 or better on the SAT exam, you will probably score well on the GRE exam, and you will be able to put together a strong graduate school application. Even if your GPA or SAT is lower than mentioned, there are still opportunities for graduate school. Another commonly held misconception is that graduate school costs too much money. You happen to be in a field that pays a stipend to graduate students for living expenses, and provides a tuition waiver, so not only does graduate school not cost money, you are actually paid to go. Most engineering institutions offer a stipend of over \$24,000 per year along with a tuition waiver.

5.9.1 Choosing a graduate program

Now that you are considering graduate school, you need to choose where to apply. Most graduate schools charge an application fee, so you probably do not want to take a shotgun approach and apply at many places. Your long term goals should play a part in your decision of where to apply. If you aspire to be a professor, it is strongly recommended that you do your graduate work away from your undergraduate institution. You should consider the reputation of the school, the program, and the researcher(s). If you are very focused on the field of study for your graduate work, the reputation of the school or the program might not be as important as the reputation of the professor you would like to have as an advisor.

5.9.2 Preparing your graduate school application packet

Most graduate schools evaluate students based on undergraduate grade point average (GPA), the Graduate Record Examinations (GRE), letters of recommendation, and the student's personal statement, statement of purpose and/or other documents authored by the applicant.

- a. **Your GPA:** By the time you decide to apply to graduate school, it is often too late to make a significant impact on your GPA. You certainly have the math skills to determine the outcome of your performance in your final year. The metric for admission is typically 3.0 out of 4.0, but that does not mean you are excluded if your GPA is below 3.0. If you can give reasonable explanations for poor GPA

- performance, you might want to address that in your document(s) that you author for your application packet.
- b. Taking the GRE test: Most engineers can do reasonably well on standardized tests, but work to maximize your score. Obtain study guides and practice with them. Plan ahead so that you have time to study, and do not wait until the last minute to schedule your exam. Try to get it done when you have a reduced amount of responsibilities. The summer between your Junior and Senior years might be a convenient time. Scoring well on this exam can make significant impact on your acceptance and your funding offer.
 - c. Letters of Recommendation: Letters of recommendation are an integral and very important part of most application evaluations. Your GPA and standardized tests scores play a significant role, but the letter of recommendation carries much more weight and can overcome GPA and test scores provided that GPA and test scores are not used to weed out applicants. This can be to your benefit if you have strong positive letters, and detriment if you have weak and/or negative letters. You should be very careful in choosing your recommenders. Some professors will give negative recommendations. Choosing your recommenders is a crucial part of the application process in that it judges your ability to determine the impression you have left upon others. A letter of recommendation is perceived to be a much stronger recommendation if the applicant waives his/her rights to view the recommendation. It is not uncommon for recommenders to require that the applicant waive his/her right to view the recommendation. Some professors limit the number of letters that they will write for an applicant. Make sure you understand your recommender's policy before you begin submitting applications with recommenders.
 - d. Your statement of purpose: There are plenty of online resources for suggestions in your statement of purpose. Try to avoid obvious, boring, and/or extraneous discussion. Keep in mind that a small committee is reading possibly hundreds of applications. You want to stand out. With that in mind, do not get hung up on this document. Spend some time writing something thoughtful, but do not sweat it too much. Make sure you proofread the document, and ask others to proofread it for you. Seek out one of your professors to read the document and give feedback.

5.9.3 Funding for graduate school

If you are pursuing a Masters with thesis, or a Ph.D, you should receive a stipend and a tuition waiver, however, there are still some funding opportunities to explore. There are several prestigious fellowships which typically pay a larger stipend than the graduate schools, and they are very beneficial in forwarding your career. Some are listed below. Keep in mind that this list is not exhaustive and you should seek out other opportunities.

- [National Science Foundation: Graduate Research Fellowship:](#)
- [National Defense Science and Engineering Graduate Fellowship:](#)
- [Department of Energy: Office of Science Graduate Fellowship Program:](#)
- [Department of Defense: Science, Mathematics, and Research for Transformation](#)

5.10 Access to the Computers and the Computer Room (HH251)

For students in MME, we want you to have appropriate access to resources that you need in order to do well in your courses. One of the good resources we have in the department is the student computer room in Hill Hall 251. Access to the use of these computers is easy, you just

log in with your Adit account. These computers have the standard programs that you would expect to see in a Windows based PC. They also contain some specialized materials software that you may be required to use during some of the MTGN courses that you will be taking.

The computer room is on a security lock which opens at 8 am and closes at 5 pm Monday through Friday. If you are an MME Junior or Senior we can provide you with Blaster card access to this room twenty-four hours a day during the semesters that you are enrolled. Please see the Departmental Program Assistant (Erin Stoll) to get the proper paperwork completed for this access.

Appendix A: CSM Student Honor Code and Policy on Academic Integrity/Misconduct

The information below has been extracted from the CSM Policies and Procedures. The various types of issues that can arise are listed in section 2.0 of the Policy on Academic Integrity/Misconduct.

Student Honor Code

1.0 PREAMBLE

The students of Colorado School of Mines have adopted the following Student Honor Code in order to establish a high standard of student behavior at Mines. The Code may only be amended through a student referendum supported by a majority vote of the Mines student body. Mines students shall be involved in the enforcement of the Code through their participation in the Student Conduct Appeals Board.

2.0 CODE

Mines students believe it is our responsibility to promote and maintain high ethical standards in order to ensure our safety, welfare, and enjoyment of a successful learning environment. Each of us, under this Code, shall assume responsibility for our behavior in the area of academic integrity. As a Mines student, I am expected to adhere to the highest standards of academic excellence and personal integrity regarding my schoolwork, exams, academic projects, and research endeavors. I will act honestly, responsibly, and above all, with honor and integrity in all aspects of my academic endeavors at Mines. I will not misrepresent the work of others as my own, nor will I give or receive unauthorized assistance in the performance of academic coursework. I will conduct myself in an ethical manner in my use of the library, computing center, and all other school facilities and resources. By practicing these principles, I will strive to uphold the principles of integrity and academic excellence at Mines. I will not participate in or tolerate any form of discrimination or mistreatment of another individual.

Policy on Academic Integrity/Misconduct

1.0 ACADEMIC INTEGRITY

The Colorado School of Mines affirms the principle that all individuals associated with the Mines academic community have a responsibility for establishing, maintaining and fostering an understanding and appreciation for academic integrity. In broad terms, this implies protecting the environment of mutual trust within which scholarly exchange occurs, supporting the ability of the faculty to fairly and effectively evaluate every student's academic achievements, and giving credence to the university's educational mission, its scholarly objectives and the substance of the degrees it awards. The protection of academic integrity requires there to be clear and consistent standards, as well as confrontation and sanctions when individuals violate those standards. The Colorado School of Mines desires an environment free of any and all forms of academic misconduct and expects students to act with integrity at all times.

2.0 POLICY ON ACADEMIC MISCONDUCT

Academic misconduct is the intentional act of fraud, in which an individual seeks to claim credit for the work and efforts of another without authorization, or uses unauthorized materials or fabricated information in any academic exercise. Student Academic Misconduct arises when a student violates the principle of academic integrity. Such behavior erodes mutual trust, distorts the fair evaluation of academic achievements, violates the ethical code of behavior upon which education and scholarship rest, and undermines the credibility of the university. Because of the serious institutional and individual ramifications, student misconduct arising from violations of academic integrity is not tolerated at Mines. If a student is found to have engaged in such misconduct sanctions such as change of a grade, loss of institutional privileges, or academic suspension or dismissal may be imposed. As a guide, some of the more common forms of academic misconduct are noted below. This list is not intended to be all inclusive, but rather to be illustrative of practices the Mines faculty have deemed inappropriate:

1. **Dishonest Conduct** - general conduct unbecoming a scholar. Examples include issuing misleading statements; withholding pertinent information; not fulfilling, in a timely fashion, previously agreed to projects or activities; and verifying as true, things that are known to the student not to be true or verifiable.
2. **Plagiarism** - presenting the work of another as one's own. This is usually accomplished through the failure to acknowledge the borrowing of ideas, data, or the words of others. Examples include submitting as one's own work the work of another student, a ghost writer, or a commercial writing service; quoting, either directly or paraphrased, a source without appropriate acknowledgment; and using figures, charts, graphs or facts without appropriate acknowledgment. Inadvertent or unintentional misuse or appropriation of another's work is nevertheless plagiarism.
3. **Falsification/Fabrication** - inventing or altering information. Examples include inventing or manipulating data or research procedures to report, suggest, or imply that particular results were achieved from procedures when such procedures were not actually undertaken or when such results were not actually supported by the pertinent data; false citation of source materials; reporting false information about practical, laboratory, or clinical experiences; submitting false excuses for absence, tardiness, or missed deadlines; and, altering previously submitted examinations.
4. **Tampering** - interfering with, forging, altering or attempting to alter university records, grades, assignments, or other documents without authorization. Examples include using a computer or a false-written document to change a recorded grade; altering, deleting, or manufacturing any academic record; and, gaining unauthorized access to a university record by any means.
5. **Cheating** - using or attempting to use unauthorized materials or aid with the intent of demonstrating academic performance through fraudulent means. Examples include copying from another student's paper or receiving unauthorized assistance on a homework assignment, quiz, test or examination; using books, notes or other devices such as calculators, PDAs and cell phones, unless explicitly authorized; acquiring without authorization a copy of the examination before the scheduled examination; and copying reports, laboratory work or computer files from other students. Authorized materials are those generally regarded as being appropriate in an academic setting, unless specific exceptions have been articulated by the instructor.

6. **Impeding** - negatively impacting the ability of other students to successfully complete course or degree requirements. Examples include removing pages from books and removing materials that are placed on reserve in the Library for general use; failing to provide team members necessary materials or assistance; and, knowingly disseminating false information about the nature of a test or examination.
7. **Sharing Work** - giving or attempting to give unauthorized materials or aid to another student. Examples include allowing another student to copy your work; giving unauthorized assistance on a homework assignment, quiz, test or examination; providing, without authorization, copies of examinations before the scheduled examination; posting work on a website for others to see; and sharing reports, laboratory work or computer files with other students.

3.0 PROCEDURES FOR ADDRESSING ACADEMIC MISCONDUCT

Faculty members and thesis committees have discretion to address and resolve misconduct matters in a manner that is commensurate with the infraction and consistent with the values of the Institution. This includes imposition of appropriate academic sanctions for students involved in academic misconduct. However, there needs to be a certain amount of consistency when handling such issues, so if a member of the Mines community has grounds for suspecting that a student or students have engaged in academic misconduct, they have an obligation to act on this suspicion in an appropriate fashion. The following procedure will be followed:

1. The faculty member or thesis committee informs the student(s) of the allegations and charge of academic misconduct within 10 business days. This involves verbal communication with the student(s). The faculty member/thesis committee must have a meeting with the student(s) regarding the incident. This meeting allows the student the opportunity to give his/her perspective prior to an official decision being made. It also allows the faculty member to have a conversation with the student(s) to educate him/her on appropriate behavior.
2. The circumstances of the academic misconduct dictate the process to be followed:
 - A. In the case of an allegation of academic misconduct associated with **regular coursework**, if after talking with the student, the faculty member feels the student is responsible for academic misconduct the faculty member should:
 - Assign a grade of "F" in the course to the student(s) that committed academic misconduct. A faculty member may impose a lesser penalty if the circumstances warrant, however the typical sanction is a grade of "F".
 - Contact the Associate Dean of Students and his/her Department Head/Division Director to officially report the violation in writing within 5 business days of the charge of academic misconduct. The Associate Dean of Students will communicate the final resolution in writing to the student, the faculty member, the Office of Academic Affairs, the Office of Graduate Studies and the student's advisor. The Associate Dean of Students will also keep official records on all students with academic misconduct violations.

Prescribed disciplinary action for misconduct associated with regular coursework:

 - 1st Offense: - A grade of "F" in the course
 - 2nd Offense: - A grade of "F" in the course
 - One-year academic suspension
 - Permanent notation of Academic Misconduct on the student's transcript

B. In the case of an allegation of academic misconduct associated with **activities not a part of regular coursework** (e.g., an allegation of cheating on a comprehensive examination), if after talking with the student, faculty member(s) feel the student is responsible for misconduct the faculty should:

- Assign an outcome to the activity that constitutes failure. If appropriate, the student's advisor may also assign a grade of "PRU" (unsatisfactory progress) for research credits in which the student is enrolled. Regular institutional procedures resulting from either of these outcomes are then followed. Faculty members may impose a lesser penalty if the circumstances warrant, however, the typical sanction is failure.
- Contact the Associate Dean of Students, Graduate Dean and the student's