MMET 201 – Manufacturing and Materials – Fall 2017

DESCRIPTION A survey of metallic and non-metallic materials; the selection and applications of materials; an introduction to traditional and non-traditional manufacturing processes, assembly processes, and metrology.

OBJECTIVES:
1. Students will be able to define, recognize, and describe common materials (metallic and non-metallic) (Understand)
2. Students will understand the properties, manufacturing processes, and typical applications for common materials (Understand)
3. Students will be able to use laboratory equipment to gather material properties using common standard tests (Apply)
4. Students will understand and integrate different manufacturing processes to solve technical problems (Understand)
5. Students will understand nomenclature and numbering systems associated with common industrial materials (Understand)
6. Students will be able to communicate and assess products using both SI and English units (Apply)

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MEETING TIME: **Lecture: MWF 10:20 a.m.-11:10 a.m. in FERM 303**
MWF: 11:30 a.m.-12:20 p.m. in FERM 303.

Lab: **Lab. Sessions are 501- 512. Please see howdy.tamu.edu**

PREREQUISITES: ENGR 111, CHEM 107 and CHEM 117

OFFICE HOURS: **W 9:00 – 10:00 a.m., F 12:30 – 1:15 p.m.**

TEXTS: Kalpakjian, S. and S. R. Schmid (2013). Manufacturing Engineering and Technology - 7th Edition. Pearson Prentice Hall.Upper Saddle River, New Jersey.

REFERENCES: Budinski, K. and Budinski, M., (2009). Engineering Materials: Properties and Selection 9th Edition. Pearson Hall

Lab note: The Lab. Notes will be posted periodically on eCampus.

Clicker: Purchase and register your i>clicker2, ISBN-13: 978-1429280471
ISBN-10: 1429280476

General Rules

1. The use of laptops and tablets to access electronic class notes will be allowed in class.
2. Class assessment via Clicker will be used in class. The first Clicker session will be on the first class of the 2nd week.
3. You are responsible for proper function of your Clicker. For technical help, contact http://www.iclicker.com/support or call 866-209-5698.
4. Purchase and register your Clicker at "www.iclicker.com/register-clicker". You will need to provide name, student ID (UIN#), and remote ID (clicker ID, non-case sensitive). No phone App.

- Your Clicker scores will not be recorded if you fail to register online although your device still functions during a Clicker session.
- Proof of online registration must be shown if you want to correct your clicker grades.
- No clicker grades for students who are taking this class and sharing the same clicker.
- You must register your clicker every semester.
- You must be in your correct class session to earn points from a Clicker quiz. You will earn 10 pts for a correct Clicker question, 1 pt. for wrong answer, and 0 for absence or in wrong group.
- You are required to have a pair of clear safety goggles with side shield for all labs. You must have leather welding gloves, and all-leather shoes without holes when working in welding lab.
- Long pants without holes, shoes, and no low-cut shirts are expected.
- All rules begin when class begins and end when class ends.
- Cell phones must be stored out of sight – not on the desk. No calls and text messages inside the classroom.
- No ear-buds or other audio devices may be used. If they are in your ears, I assume you are using them.
- No talking unless asking a question or answering a question. If you want to talk to your neighbor, take it outside the classroom. To ask a question, raise your hand and wait to be recognized.

Tests

1. Closed-book and closed-note tests.
2. The scope of each test will be announced in class.
3. You will need an 882-E Scantron (4.25x11 inch) for a regular test.
4. The makeup test format might be different from the regular test format.
5. No electronic communicating device is allowed in a test. This includes calculator on a cell phone.
6. It is the student responsibility to ask for the makeup tests with an excused absence.

Laboratory

1. If you miss a lab, you might make it up during the week(s) for that lab. You are allowed to have up to 2 make-up sessions. A permission from your professor is needed to be able to make up the lab.
2. You will have quizzes in the lab.
3. If no quizzes are given, the whole 15% of the lab. grade will be based on the lab. work.

Grades

1. Check eCampus for handout, updated schedule, syllabus, homework & solution, and cumulative grades.
2. Any grade dispute must be settled with your TAs (lab) and your Professor (hw, test, class Clicker) in person.
3. There will be no grade correction after <u>one week</u> following each grade-posting date. You can only change a new grade entry for subsequent posting.
4. Late homework: 0 point deduction if submitted in class on the due date, -25 points afterward. No late homework is accepted after the solution is posted.
5. A group will be deducted 50% of their lab grade from operating equipment in that specific lab if they damage a machine or an instrument.
6. To pass the course, the numeric lab grade must be > 60%.
7. Grade distribution (%)

Test 1	Test 2	Test 3	Laboratory and Lab. quizzes	Class Clicker	Homework	
20%	20%	25%	15%: 12 % for the lab. work and 3% for quizzes (To pass the course, the numeric lab grade must be > 60%)	10%	10%	90% ≤ A 80% ≤ B < 90% 70% ≤ C < 80% 60% ≤ D < 70% F < 60%

8. Any make-up /special test must be agreed and arranged before a scheduled class test.

Attendance

- Class/lab attendance will be randomly checked. You must be in the correct class/lab session to sign. You are allowed to sign attendance after the actual date if (i) you present a university excuse before leaving, or (ii) have an official medical note within 1 week after your return date.

NOTES AND COMMENTS:

Excused Absences
Absences will be excused only per Student Rule 7, which may be found at:
http://student-rules.tamu.edu/rule7.htm.
Documentation must be provided from a health care professional in the event of an excused absence due to illness.

WEEK		TOPIC	READINGS	Lab.
1 – 08/28	M	- Course Content and Policies. - Introduction. - Fundamentals of Materials, Mechanical Behavior, testing, and manufacturing properties of Materials	Ch. 1	No Lab.
	W	Mechanical Behavior, testing, and manufacturing properties of Materials	Ch. 2	
	F	Mechanical Behavior, testing, and manufacturing properties of Materials	Ch. 2	
2 – 09/4	M	Polymers: The structure of polymers	Ch. 7	Tensile Testing, Polymers Testing: How to identify different plastics
	W	Polymers: Types of polymers and additives	Ch. 7 & class notes	
	F	Extrusion, molding and Thermoforming processes	Ch. 19	
3 – 09/11	M	Polymers: Commercial Considerations	Class Notes	Hardness and impact Toughness tests of plastic materials
	W	Measurement: Analog and Digital Measurements.	Ch. 35	
	F	Traditional and Modern Measuring Methods and Instruments.	Ch. 35	
4 – 09/18	M	Characteristics and Selection of measuring instruments. Geometric Dimensioning and Tolerancing.	Ch. 35	Metrology
	W	Structure and types of Ceramics.	Ch. 8	
	F	Properties and applications of Ceramics.	Ch. 8	

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5 – 09/25	M	Manufacturing Processes for Ceramics	Ch. 18, Class notes	Extrusion, Thermoforming and Injection Molding of plastics materials
	W	**Test # 1**		
	F	Non-ferrous Metals: Properties, designation system, and applications of Aluminum and Magnesium Alloys.	Ch. 6	
6 – 10/02	M	Non-ferrous Metals: Properties, designation system, and applications of Titanium and Copper alloys.	Ch. 6	Compression Molding of plastics. Ceramics Manufacturing: Demo in how to make the coffee Mug
	W	Refractory Metals, Low melting and shape memory alloys	Ch. 6	
	F	Steel: Production of Iron and Steel	Ch. 5	
7 – 10/9	M	Carbon and alloy steels and their applications, Steel Alloys Designation System	Ch. 5	Ferrous and Non-ferrous Metal Properties: Impact Test
	W	Stainless Steels, Tool and Die Steels and their applications	Ch. 5	
	F	Structure of Alloys and phase diagrams.	Ch. 4	
8 –10/16	M	Strengthening of ferrous and Nonferrous alloys by heat treatment.	Ch. 4	Heat Treatment of ferrous and nonferrous alloys with hardness Test
	W	The structure and properties of Reinforced Plastics	Ch. 9	
	F	The structure and properties of Reinforced Plastics	Ch. 9	
9 – 10/23	M	Applications of Reinforced Plastics	Ch. 9	Machining of metals
	W	Metal – Matrix Composites and Ceramic Matrix Composites and Applications	Ch. 9	
	F	Traditional machining processes: Milling, Turning, drilling, etc.	Ch. 21, 23, 24	
10 – 10/30	M	Traditional machining processes: Milling, Turning, drilling, etc.	Ch. 21, 23, 24	CNC _Demo, Micro machining, and EDM
	W	**Test #2**		
	F	Cutting Tool Materials and Tool Life (Wear and Failure)	Ch. 22	
11 – 11/6*	M	Abrasive Machining and Finishing Operations	Ch. 26	Investment casting
	W	Non -Traditional machining processes: Chemical machining, ECM, EDM, etc	Ch. 27	
	F	Non -Traditional machining processes: Chemical machining, ECM, EDM, etc	Ch. 27	
12 – 11/13	M	Joining and Assembly Processes: Fusion Welding Processes	Ch. 30	Virtual welding
	W	Joining and Assembly Processes: Fusion Welding Processes	Ch. 30	

	F	Solid – State Welding Processes, Brazing, and Soldering.	Ch. 31, 32	
13 – 11/20	M	Forming and Shaping Processes and Equipment: Rolling and Forging of metals	Ch. 13, 14	No Lab.
	W	**No classes (Reading day)**		
	F	**Thanksgiving**		
14 – 11/27	M	Extrusion and Drawing of Metals	Ch. 15	Welding: SMAW, GTAW and GMAW
	W	sheet metal forming	Ch. 16	
	F	**Test #3**		
15 – 12/4	M	TBD	Ch. 16	No Lab.
	W	TBD		
	F	No Class		

* 11/17 (Friday, 5:00 p.m.) Q-drop deadline

Laboratory Safety Rules: Major safety concerns are listed below, but others may arise. If so, your lecture or lab instructor will inform you. Violations of safety rules will result in a 10% reduction in your final lab grade per incident.

1. **Supervision** - Never work in a laboratory without proper supervision. Your best protection against accidents is the presence of a trained, conscientious supervisor who is watching for potentially dangerous situations. This includes working with all equipment that are prepared for the purpose of this lab.
2. **Computer and Software -** These are prepared for instructional purposes. You are supposed to use them according to the requirements of the lab handout. Any improper use of this material, such as installing any kind of software, is strictly prohibited.
3. **Food and Drinks in the Lab -** Food and drinks are never allowed in the Lab. This includes all visible insulated water bottles or mugs, containers of water or flavored drinks, containers of ice intended for consumption, etc. If a food or drink container is empty or unopened, it must be inside a backpack or equivalent and out of sight.
4. **No Unauthorized Experiments -** Any experimentation not required by the laboratory manual or approved by your instructor is considered to be unauthorized experimentation.

Disruptive Behavior: If a student's behavior in class is sufficiently disruptive to warrant immediate action, the instructor is entitled to remove a student on an interim basis, pending an informal hearing with the Head of the Department offering the course. This hearing must take place within three working days of the student's removal. This rule and supporting information may be found at http://student-rules.tamu.edu/rule21. Your cooperation is expected.

Plagiarism and Intellectual Property: The handouts used in this course are copyrighted. "Handouts" means all materials generated for this class, which include but are not limited to syllabi, quizzes, exams, lab problems, in-class materials, review sheets, and additional problem sets. Because these materials are copyrighted, you do not have the right to copy the handouts, unless you are expressly granted permission by the copyright holder.

As commonly defined plagiarism consists of passing off as one's own the ideas, words, writings, etc., which belong to another. In accordance with this definition, you are committing plagiarism if you copy the work of another person and turn it in as your own, even if you should have the permission of that person. Plagiarism is one of the worst academic sins, for the plagiarist destroys the trust among colleagues without which research cannot be safely communicated.

If you have any questions regarding plagiarism, please consult the latest issue of the *Texas A&M University Student Rules*, under the section "Scholastic Dishonesty."

American with Disabilities (ADA) Policy Statement: The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that

provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please contact Disability Services, currently located in the Disability Services building at the Student Services at White Creek complex on west campus or call 979-845-1637. For additional information, visit **http://disability.tamu.edu.**

. **Academic Integrity:** "*An Aggie does not lie, cheat or steal or tolerate those who do.*" The Aggie Code of Honor is an effort to unify the aims of all Texas A&M men and women toward a high code of ethics and personal dignity. For most, living under this code will be no problem, as it asks nothing of a person that is beyond reason. It only calls for honesty and integrity, characteristics that Aggies have always exemplified. The Aggie Code of Honor functions as a symbol to all Aggies, promoting understanding and loyalty to truth and confidence in each other.

See http://student-rules.tamu.edu/rule20 and http://aggiehonor.tamu.edu for more information about Student Rules and the Aggie Honor System.

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Relation between MMET 201 Course Objectives and MMET Program Outcomes

The Manufacturing and Mechanical Engineering Technology (MMET) program is designed to provide the student with several skills at the time of graduation. These skills and abilities are stated in the following MMET Program Outcomes:

A Manufacturing and Mechanical Engineering Technology graduate has the following abilities at the time of graduation:

(a) An appropriate mastery of the knowledge, techniques, skills and modern tools of manufacturing and mechanical systems and processes.
(b) An ability to apply current knowledge and adapt to emerging applications of mathematics, science, engineering and technology.
(c) An ability to conduct, analyze and interpret experiments and apply experimental results to improve processes.
(d) An ability to apply creativity in the design of systems, components or processes appropriate to program objectives.
(e) An ability to function effectively on teams.
(f) An ability to identify, analyze and solve technical problems.
(g) An ability to communicate effectively.
(h) A recognition of the need for, and an ability to engage in lifelong learning.
(i) An ability to understand professional, ethical and social responsibilities.
(j) A respect for diversity and a knowledge of contemporary professional, societal and global issues.
(k) A commitment to quality, timeliness, and continuous improvement.
(l) An ability to apply the technologies of engineering materials, manufacturing processes, automation, production operations, quality, statics, dynamics, strength of materials, fluid power or fluid mechanics, thermodynamics, and either electrical power or electronics, and statistics to the solution of manufacturing problems.
(m) An ability to apply with an added technical depth: manufacturing processes, mechanical design, electro-mechanical devices and controls (automation), and production operations.
(n) An ability to apply physics having an emphasis in applied mechanics, plus added technical topics in physics and inorganic chemistry principles related to manufacturing and mechanical systems and processes.
(o) *An ability to successfully complete a comprehensive design project related to mechanical or manufacturing fields*.

The following table indicates how this course contributes to the achievement of the overall programmatic educational outcomes. Entries with an "H", "M", and "L", refer to high, medium, and low relevancy, respectively.

	MMET Program Educational Outcome														
COURSE OBJECTIVE	**a**	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**	**l**	**m**	**n**	**o**
1. Students will be able to define, recognize, and describe common materials (metallic and non-metallic) (Understand)	**H**	**L**	**L**					**M**			**M**	**H**	**L**	**L**	
2. Students will understand the properties, manufacturing processes, and typical applications for common materials (Understand)	**H**	**M**	**L**	**L**				**M**		**L**	**H**	**H**	**H**	**L**	
3. Students will be able to use laboratory equipment to gather material properties using common standard tests (Apply)	**H**	**M**	**H**		**H**		**M**	**H**			**M**	**H**	**H**	**M**	
4. Students will understand and integrate different manufacturing processes to solve technical problems (Understand)	**M**	**L**	**L**	**L**		**H**		**M**			**M**	**H**	**H**	**L**	
5. Students will understand nomenclature and numbering systems associated with common industrial materials (Understand)	**H**	**L**	**L**	**L**				**H**			**L**	**M**	**L**	**L**	
6. Students will be able to communicate and assess products using both SI and English units (Apply)	**L**	**L**	**L**					**H**			**H**	**M**	**L**	**M**	

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Relation between MMET 201 Course Objectives and ABET Outcomes

(a) an ability to select and apply the knowledge, techniques, skills, and modern tools of the discipline to broadly-defined engineering technology activities;
(b) an ability to select and apply a knowledge of mathematics, science, engineering, and technology to engineering technology problems that require the application of principles and applied procedures or methodologies;
(c) an ability to conduct standard tests and measurements; to conduct, analyze, and interpret experiments; and to apply experimental results to improve processes;
(d) an ability to design systems, components, or processes for broadly-defined engineering technology problems appropriate to program educational objectives;
(e) an ability to function effectively as a member or leader on a technical team;
(f) an ability to identify, analyze, and solve broadly-defined engineering technology problems;
(g) an ability to apply written, oral, and graphical communication in both technical and non-technical environments; and an ability to identify and use appropriate technical literature;
(h) an understanding of the need for and an ability to engage in self-directed continuing professional development;
(i) an understanding of and a commitment to address professional and ethical responsibilities including a respect for diversity;
(j) a knowledge of the impact of engineering technology solutions in a societal and global context; and
(k) a commitment to quality, timeliness, and continuous improvement.

The following table indicates how this course contributes to the achievement of the ABET educational outcomes. Entries with an "H", "M", and "L", refer to high, medium, and low relevancy, respectively.

	ABET Outcome										
COURSE OBJECTIVE	**a**	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**
1. Students will be able to define, recognize, and describe common materials (metallic and non-metallic) (Understand)	**H**	**L**	**L**	**M**	**L**	**L**		**M**		**L**	
2. Students will understand the properties, manufacturing processes, and typical applications for common materials (Understand)	**H**	**L**	**L**	**M**	**L**	**M**		**M**		**L**	**M**
3. Students will be able to use laboratory equipment to gather material properties using common standard tests (Apply)	**H**	**M**	**H**	**M**	**H**	**M**	**H**	**M**		**L**	**M**
4. Students will understand and integrate different manufacturing processes to solve technical problems (Understand)	**L**	**M**	**L**	**M**	**M**	**M**		**L**			
5. Students will understand nomenclature and numbering systems associated with common industrial materials (Understand)	**L**	**L**	**L**	**M**	**L**	**L**		**H**			
6. Students will be able to communicate and assess products using both SI and English units (Apply)	**L**	**L**	**H**	**M**	**M**	**M**	**M**	**H**			**H**