Bachelor of Technology Partnership

Course Outline

1. COURSE INFORMATION

Session Offered	Fall 2015	
Course Name	Materials Technology	
Course Code	AUTOTECH 2MT3	
Date(s) and Time(s) of lectures	Wednesdays 15:30 – 16:20, Fridays 8:30 – 10:20	
Program Name	Automotive and Vehicle Technology	
Calendar Description	Physical properties including tensile and impact of materials, ductile and brittle fracture, testing, applications and selection of ceramics, metals and alloys, polymers and advanced materials used in automobiles and vehicles. Metal casting for automotive applications. Case studies.	
Instructor	Doris Clayton	E-Mail: claytodb@mcmaster.ca 905-575-1212 x3465
Lab Instructors	Moein Mehrtash	
	Pedro Tondo	

2. COURSE SPECIFICS

Course Description

Instruction Type

Code	Type	Hours per term
C	Classroom instruction	39
L	Laboratory, workshop or fieldwork	39
T	Tutorial	
DE	Distance education	
	Total Hours	78

Resources

ISBN	Textbook Title & Edition	Author & Publisher
ISBN: 9781119917861	AUTO TECH 2MT3 (Custom Textbook)	Newell and Riley, Wiley Publishing

Other Supplies	Source
	AUTO TECH 2MT3 Laboratory Manual (available on Avenue to Learn)

Prerequisite(s)	ENG TECH 1CH3, 1ME3, 1PH3
Corequisite(s)	
Antirequisite(s)	
Course Specific Policies	Students must attend and participate in all laboratory exercises in order to receive credit for each experiment. Late report submissions will not be accepted.
Departmental Policies	Students must maintain a GPA of 3.5/12 to continue in the program. In order to achieve the required learning objectives, on average, B.Tech. students can expect to do at least 3 hours of "out-of-class" work for every scheduled hour in class. "Out-of-class" work includes reading, research, assignments and preparation for tests and examinations. Where group work is indicated in the course outline, such collaborative work is mandatory.

	The use of cell phones, iPods, laptops and other personal electronic devices are prohibited from the classroom during the class time, unless the instructor makes an explicit exception. Announcements made in class or placed on Avenue are considered to have been communicated to all students including those individuals that are not in class. Instructor has the right to submit work to software to identify plagiarism.	
3. SUB TOPIC(S)		
Properties of Materials (Chapter numbers refer to the course textbook)		
Week 1	**Module 1: Introduction** Overview of Materials Science Property considerations for specific applications Classes of materials	Chapter 1
Week 2	**Module 2: Structure of Materials** Atomic structure and bonding Crystal structure Density calculations Crystallographic planes and directions	Chapters 1 and 2
Week 3	**Module 2: Structure of Materials** X-ray diffraction Nucleation and grain growth of crystals Defects in crystalline solids	Chapter 2
Week 4	**Module 3: Measurement of Mechanical Properties** Tensile testing Hardness Impact testing Fatigue and creep testing	Chapter 3
Week 5	**Module 4: Metals** Forming operations Alloys and phase diagrams Lever rule calculations	Chapter 4
Mid-term recess (Monday, October 12 to Saturday, October 17)		
Week 6	**Module 4: Metals** The iron-carbon phase diagram Equilibrium and non-equilibrium phases The heat treatment of carbon steels	Chapter 4
Week 7	**Module 4: Metals** Precipitation hardening Aluminum alloys Copper Alloys	Chapter 4
Week 8	**Module 5: Corrosion** Electrochemical cells and the galvanic series Types of corrosion Materials selection and design for corrosion prevention Cathodic and anodic protection Coatings	Chapter 4
Week 9	**Module 6: Polymers** Polymer chemistry Polymer structure Production of polymers Mechanical properties of polymers	Chapter 5
Week 10	**Module 7: Composite materials**	Chapter 6

	Properties, synthesis and design of fibre composites Properties and examples of particulate composites Laminar and sandwich composites	
Strength of Materials		
Week 11	**Module 8: Transformations of Stress** Calculations involving plane stresses and principal stresses Maximum shearing stress	Chapter 7
Week 12	**Module 8: Transformations of Stress** Stress transformations using Mohr's circle Three-dimensional analysis of stresses	Chapter 7
Week 13	**Module 9: Deflection of Beams** Deformation of a beam under transverse loading Equation of the elastic curve Determination of the elastic curve from load distribution	Chapters 8 and 9

Classes end – Tuesday December 8, 2015
Final examination period: Wednesday December, 9, 2015 to Tuesday, December 22, 2015
All examinations MUST BE written during the scheduled examination period.

List of experiments	
Week 1	Introduction and lab safety
Weeks 1 and 2	Microscopy
Week 3	Mechanical properties of metals
Weeks 4 and 5	Plastic deformation
Mid-term recess (Monday, October 12 to Saturday, October 17)	
Weeks 6 and 7	Annealing heat treatment
Weeks 8 and 9	Hardening of steels
Weeks 10 and 11	Precipitation hardening
Week 12	Mechanical properties of plastics
Week 13	Characterization of composites

Note that this structure represents a plan and is subject to adjustment term by term.
The instructor and the University reserve the right to modify elements of the course during the term. The University may change the dates and deadlines for any or all courses in extreme circumstances. If either type of modification becomes necessary, reasonable notice and communication with the students will be given with explanation and the opportunity to comment on changes.

4. ASSESSMENT OF LEARNING	**Weight**
Mid-term tests (2)	40
Labs	30
Final examination (tests cumulative knowledge)	30
TOTAL	**100%**

Percentage grades will be converted to letter grades and grade points per the University calendar.

5. LEARNING OUTCOMES

1. Relate the microstructures of materials to their physical and mechanical properties
2. Perform various mechanical tests (including tensile, hardness, impact) on both metals and non-metals and report the results
3. Prepare metallographic samples and examine basic microstructures using an optical microscope
4. Use binary phase diagrams to interpret the results of heat treating ferrous and non-ferrous metals and recommend heat treatment schedules for specific applications
5. Differentiate between the different types of corrosion and select strategies for minimizing corrosion
6. Evaluate the state of stress on various materials under various loading conditions
7. Apply the principles of mechanics of materials to the deflection of beams and shafts under various loads

6. POLICIES

Anti-Discrimination

The Faculty of Engineering is concerned with ensuring an environment that is free of all discrimination. If there is a problem, individuals are reminded that they should contact the Department Chair, the Sexual Harassment Officer or the Human Rights Consultant, as soon as possible.
http://www.mcmaster.ca/policy/General/HR/Anti-Discrimination%20policy.pdf

Academic Integrity

You are required to exhibit honestly and use ethical behaviour in all aspects if the learning process. Academic credentials you earn are rooted in principles of honesty and academic integrity.

Academic dishonesty is to knowingly act of fail to act in a way that results or could result in unearned academic credit or advantage. This behaviour can result in serious consequences e.g. the grade of zero on an assignment, loss of credit with a notation on the transcript (notation reads: "Grade of F assigned for academic dishonesty"), and/or suspension or expulsion from the university.

It is your responsibility to understand what constitutes academic dishonesty. For information on the various kinds of academic dishonesty please refer to the Academic Integrity Policy, located at: http://www.mcmaster.ca/policy/Students-AcademicStudies/AcademicIntegrity.pdf .

The following illustrates only three forms of academic dishonesty:

1. Plagiarism. E.g. the submission of work that is not own or for which other credit has been obtained
2. Improper collaboration in group work
3. Copying or using unauthorized aids in tests and examinations.

Requests for Relief for Missed Academic Term Work (Assignments, Mid-Terms, etc.)

The McMaster Student Absence Form is a self-reporting tool for **Undergraduate Students** to report absences that last up to 3 days and provides the ability to request accommodation for any missed academic work. Please note, this tool cannot be used during any final examination period.

You may submit a maximum of 1 Academic Work Missed requests per term. It is YOUR responsibility to follow up with your Instructor immediately regarding the nature of the accommodation.

If you are absent more than 3 days or exceed 1 request per term you MUST visit your Associate Dean's Office (Faculty Office). You may be required to provide supporting documentation.

This form should be filled out immediately when you are about to return to class after your absence.
http://www.mcmaster.ca/msaf/

E-Learning Policy

Consistent with the Bachelor of Technology's policy to utilize e-learning as a complement to traditional classroom instruction, students are expected to obtain appropriate passwords and accounts to access Avenue To Learn for this course. Materials will be posted by class for student download. It is expected that students will avail themselves of these materials prior to class. Students should be aware that, when they access the electronic components of this course, private information such as first and last names, user names for the McMaster e-mail account, and program affiliation may become apparent to all other students in the course. The available information is dependent on the technology used. Continuation in this course will be deemed consent to this disclosure. If you have any questions or concerns about this disclosure please discuss this with the course instructor. Avenue can be accessed via http://avenue.mcmaster.ca.

Communications

It is the student's responsibility to:

- Maintain current contact information with the University, including address, phone numbers, and emergency contact information.
- Use the University provided e-mail address or maintain a valid forwarding e-mail address.
- Regularly check the official University communications channels. Official University communications are considered received if sent by postal mail, by fax, or by e-mail to the student's designated primary e-mail account via their @mcmaster.ca alias.
- Accept that forwarded e-mails may be lost and that e-mail is considered received if sent via the student's @mcmaster.ca alias.

- Check the McMaster/Avenue email and course websites on a regular basis during the term.

Turnitin (Optional)

This course will be using a web-based service (Turnitin.com) to reveal plagiarism. Students submit their assignment/work electronically to Turnitin.com where it is checked against the internet, published works and Turnitin's database for similar or identical work. If Turnitin finds similar or identical work that has not been properly cited, a report is sent to the instructor showing the student's work and the original source. The instructor reviews what Turnitin has found and then determines if he/she thinks there is a problem with the work. Students who do not wish to submit their work to Turnitin.com must still submit a copy to the instructor. No penalty will be assigned to a student who does not submit work to Turnitin.com. All submitted work is subject to normal verification that standards of academic integrity have been upheld (e.g., on-line search, etc.). To see the Turnitin.com Policy, please go to
http://www.mcmaster.ca/academicintegrity/turnitin/students/

Protection of Privacy Act (FIPPA)

The Freedom of Information and Protection of Privacy Act (FIPPA) applies to universities. Instructors should take care to protect student names, student numbers, grades and all other personal information at all times. For example, the submission and return of assignments and posting of grades must be done in a manner that ensures confidentiality.
http://www.mcmaster.ca/univsec/fippa/fippa.cfm

Academic Accommodation of Students with Disabilities Policy

Students who require academic accommodation must contact Student Accessibility Services (SAS) to make arrangements with a Program Coordinator. Academic accommodations must be arranged for each term of study. Student Accessibility Services can be contacted by phone 905-525-9140 ext. 28652 or e-mail sas@mcmaster.ca. For further information consult McMaster's policy for Academic Accommodation of Students with Disabilities
http://www.mcmaster.ca/policy/Students-AcademicStudies/AcademicAccommodation-StudentsWithDisabilities.pdf

Students must forward a copy of the SAS accommodation to the instructor of each course and to the Program Administrator of the B.Tech. Program immediately upon receipt. If a student with a disability chooses NOT to take advantage of a SAS accommodation and chooses to sit for a regular exam, a petition for relief may not be filed after the examination is complete. http://sas.mcmaster.ca

Student Code of Conduct

The Student Code of Conduct (SCC) exists to promote the safety and security of all the students in the McMaster community and to encourage respect for others, their property and the laws of the land. McMaster University is a community which values mutual respect for the rights, responsibilities, dignity and well-being of others. The purpose of the Student Code of Conduct is to outline accepted standards of behavior that are harmonious with the goals and the well-being of the University community, and to define the procedures to be followed when students fail to meet the accepted standards of behavior. All students have the responsibility to familiarize themselves with the University regulations and the conduct expected of them while studying at McMaster University.
http://judicialaffairs.mcmaster.ca/pdf/SCC.pdf