

Course Outline

1. COURSE INFORMATION			
Session Offered	Fall 2015		
Course Name	Automotive Engineering Technology I		
Course Code	AUTO TECH 2AE3		
Program Name	Automotive and Vehicle Technology		
Calendar Description	Stress and strain; deformation; failure prediction; lubrication, friction and wear; columns; cylinders; shafts, hydrodynamic, hydrostatic and rolling bearings; gears; fasteners; springs; brakes and clutches; disassemble and reassemble vehicle systems.		
Instructor(s)	Dr. Peter Basl	Phone:	
		E-Mail:	baslpa@mcmaster.ca
		Office Hours & Location:	Arranged by email
2. COURSE SPECIFICS			
Course Description	This course covers the theory and methodology related to conceptual design of machine elements used in automotive engineering. The lecture component reviews of the methods used in stress analysis and covers an analysis of the loads that produce various forms of stress. The failure of the machine components due to plastic distortion and fracture, impact and fatigue are studied. The design and analysis of fasteners, sliding and rolling bearings, gears, shafts, clutches and brakes are covered in depth. The lab component of the course allows the students to identify, inspect and analyse automotive transmission and engines components, and to understand their design principles		
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
	978-0-471-66177-1	Fundamentals of Machine Component Design, 5 th ed.	Juvinall R. & Marshek K., Wiley and Sons Inc.
	Other Supplies	Source	
	Safety glasses Safety shoes		
Prerequisite(s)	ENG TECH 1CH3, 1EL3, 1ME3, 1PH3		
Course Specific Policies	<ul style="list-style-type: none"> - All mathematical steps must be shown to get full credit for the tests - Lab attendance is mandatory. Participation and involvement is graded. - The lab quizzes can be taken only if the corresponding lab was attended - The lab manual, downloadable from AVENUE, must be printed and brought to the labs - The course contains a lecture component and a lab component. A minimum grade of 50% is required to pass each component of the course. 		

Policies	<p>Students must maintain a GPA of 3.5 on a 12 point scale to continue in the program.</p> <p>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.</p> <p>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.</p> <p>Announcements made in class or placed on Avenue are considered to have been communicated to all students including those not in class.</p>	
3. SUB TOPIC(S)		
Week 1	<p>Review: Stress analysis</p> <ul style="list-style-type: none"> - Normal and shear stresses - Stress due to by bending - Stress due to torsion <p>Load analysis</p> <ul style="list-style-type: none"> - Systems of units - Methodology for solving machine components problems - Work and energy. Conservation of energy. Power - Equilibrium equations and free-body diagrams - Beam loading 	Chapters 1 & 2
Week 2	<p>Failure theories</p> <p>Fracture mechanics.</p> <p>Safety factors</p>	Chapter 6
Week 3	<p>Impact.</p> <p><i>Test #1: Load analysis and Fracture mechanics</i></p>	Chapter 7
Week 4	<p>Fatigue.</p>	Chapter 8
Week 5	<p>Fasteners.</p> <p><i>Test #2: Impact and Fatigue</i></p>	Chapter 10
Week 6	<p>Lubrication and sliding bearings</p>	Chapter 13
Week 7	<p>Rolling-element bearings</p>	Chapter 14
Week 8	<p>Spur Gears</p> <p><i>Test #3: Fasteners, Lubrication and All bearings</i></p>	Chapter 15
Week 9	<p>Helical and bevel gears</p>	Chapter 16
Week 10	<p>Shafts</p> <p><i>Test #4: Spur, Helical & Bevel gears</i></p>	Chapter 17
Week 11	<p>Clutches and brakes</p>	Chapter 18
Week 12	<p>Miscellaneous machine components</p>	Chapter 19
Week 13	<p>Review</p>	
Final Examination	<p>Scheduled during the regular University Final Examination period established by the Registrar’s Office.</p>	
Proposed list of experiments		
Lab 1	Safety training and orientation	
Lab 2	Mechanical transmission	
Lab 3	Mechanical transmission	
Lab 4	Mechanical transmission	
Lab 5	Automatic transmission	
Lab 6	Automatic transmission	

Lab 7	Automatic transmission
Lab 8	Engine overhaul
Lab 9	Engine overhaul
Lab 10	Engine overhaul
Lab 11	Engine overhaul
Lab 12	Engine overhaul
Lab 13	Engine overhaul
Lab schedule	Some of the labs will be performed on a rotating basis. The actual lab schedule will be provided by the instructor
<p>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.</p>	
4. ASSESSMENT OF LEARNING	
	Weight
Lab attendance and involvement	10
Quizzes (4)	10
Lab reports	20
Assignments (8)	10
Theory tests (4)	20
Final examination	30
	TOTAL 100%
<p>Course results determined on a percentage scale will be converted to an official letter grade, as indicated in the Undergraduate Calendar. The results of all courses attempted will appear on your transcript as letter grades.</p>	
5. LEARNING OUTCOMES	
1. Disassemble and assemble automotive transmission and engines, identify their components, understand the design and the principles used for assembly	
2. Inspect and measure the machine components of automotive engines and transmission, recognize excessive wear, damaged or missing parts, check on gear endplay, looseness of shafts, and clearances	
3. Perform measurements for cylinders, pistons, journal bearings and connecting rods and understand the importance of the allowed tolerances and clearances required for proper operation	
4. Analyse machine components using stress-strain-strength relationship, surface phenomena including friction, lubrication, wear and environmental deterioration, as well as failure modes and safety factors considerations	
5. Apply methodologies for solving machine components problems and know the difference between analysis and design	
6. Design fasteners, springs, bearings, gears, shafts, clutches, brakes and flexible machine components	
7. Take appropriate decisions for design based on a reasonable assumption and analyse if better results might be obtained by making different decisions or relaxing certain assumptions	
8. Apply the fundamentals as well as empirical information to design specific automotive components	
9. Use ingenuity, insight, imagination, and prolonged diligent effort to deal effectively with engineering problems associated with an individual machine component	
10. Design machine components based on functional, economic, safety, ecological, and societal considerations	
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

Attention is drawn to the Statement on Academic Ethics and the Senate Resolutions on Academic Dishonesty as found in the Senate Policy Statements distributed at registration and available in the Senate Office. Any student who infringes one of these resolutions will be treated according to the published policy.

Academic dishonesty consists of misrepresentation by deception or by other fraudulent means and 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, specifically Appendix 3, located at:

<http://www.mcmaster.ca/policy/Students-AcademicStudies/AcademicIntegrity.pdf>

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 5 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 5 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. 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 will be expected to submit their work electronically to Turnitin.com and in hard copy so that it can be checked for academic dishonesty. 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/>

Protection of Privacy Act (FIPPA)

The Freedom of Privacy 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

The Centre for Student Development is committed to the continuous improvement of accessibility for students with disabilities. Students are encouraged to contact CSD as early as possible before each term starts to become familiar with the services offered and to confirm their accommodations.

Students must forward a copy of the CSD 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 CSD accommodation and chooses to sit for a regular exam, a petition for relief may not be filed after the examination is complete. <http://csd.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>