

Course Outline

1. COURSE INFORMATION

Session Offered	Fall 2015	
Course Name	Finite Element Analysis	
Course Code	ENG TECH 3FE3	
Date(s) and Time(s) of lectures	C01 – Tu: 3.30-6.30pm MARC 269 C02 – We: 2.30-5.30pm MARC 269	
Program Name	Automotive Vehicle Technology	
Calendar Description	Matrix techniques; eigenvalue problems; equations of elasticity: plane stress, plane strain, 3D problems; variational methods; element types, element stiffness, mass matrices and load vector; assemblage of elements, boundary conditions.	
Instructor(s)	Seshasai Srinivasan	E-Mail: ssriniv@mcmaster.ca Office Hours & Location: M 11.30-12.30

2. COURSE SPECIFICS

Course Description			
Instruction Type	Code	Type	Hours per term
	C	Classroom instruction	27
	L	Laboratory, workshop or fieldwork	12
	T	Tutorial	
	DE	Distance education	
	Total Hours		39
Resources	ISBN	Textbook Title & Edition	Author & Publisher
	ISBN: 978-0-13-384080-3	Finite Element Analysis – Theory and Applications with ANSYS, 4th Ed.	Saeed Moaveni Pearson
	Other Supplies	Source	
Prerequisite(s)	AUTOTECH 2AC3, 2TS3, ENG TECH 3MN3 and registration in Level III of Automotive and Vehicle Technology		
Corequisite(s)	<i>None</i>		
Antirequisite(s)	ENG TECH 2FE3, 3FA3, 3FN3		
Course Specific Policies	Assignments and lab reports will be submitted through Avenue as per posted due dates. A submission after the deadline or by e-mail will not be considered for marking or review.		
Departmental Policies	<p>Students must maintain a GPA of 3.5/12 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>Where group work is indicated in the course outline, such collaborative work is mandatory.</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 individuals that are not in class.</p> <p>Instructor has the right to submit work to software to identify plagiarism.</p>	
3. SUB TOPIC(S)		
Week 1	FEA capabilities of CATIA Lab #1: FEA using CATIA – Part analysis	Class notes
Week 2	Introduction to FEA. Basic steps. Approaches. Verification of results Lab #2: FEA using CATIA – Assembly analysis	Class notes
Week 3	Trusses: definition, finite element formulation, space trusses. Lab #3: Truss analysis using ANSYS	Chapter 3
Week 4	Axial members, beams and frames. Lab #4: Axial members analyses using ANSYS	Chapter 4
Week 5	Test #1	Weeks 1, 2
<i>Mid-term recess (Monday, October 12 to Saturday, October 17)</i>		
Week 6	One-dimensional elements	Chapter 5
Week 7	Analysis of one-dimensional problems Lab #5: One-dimensional problems analyses using ANSYS	Chapter 6
Week 8	Two-dimensional heat transfer Lab #6: Two-dimensional heat transfer analysis using ANSYS	Chapter 7+9
Week 9	Two-dimensional solid mechanics Lab #7: Two-dimensional solid mechanics analysis using ANSYS	Chapter 10
Week 10	Test #2	Weeks 3-7
Week 11	Three-dimensional elements Lab #8: Three-dimensional heat transfer analysis using ANSYS	Chapter 13
Week 12	Three-dimensional elements Lab #9: Three-dimensional solid elements analyses using ANSYS	Chapter 13
Week 13	Review	Weeks 1-12
<p>Classes end – Tuesday December 8, 2015</p> <p>Final examination period: Wednesday December, 9, 2015 to Tuesday, December 22, 2015</p> <p>All examinations MUST BE written during the scheduled examination period.</p> <p>Scheduled during the regular University Final Examination period established by the Registrar's Office.</p>		
List of labs		
Lab 1	FEA using CATIA – Part analysis	
Lab 2	FEA using CATIA – Assembly analysis	
Lab 3	Truss analysis using ANSYS	
Lab 4	Axial members analyses using ANSYS	
Lab 5	One-dimensional problems analyses using ANSYS	
<i>Mid-term recess (Monday, October 12 to Saturday, October 17)</i>		
Lab 6	Two-dimensional heat transfer analysis using ANSYS	
Lab 7	Two-dimensional solid mechanics analysis using ANSYS	

Lab 8	Three-dimensional heat transfer analysis using ANSYS
Lab 9	Three-dimensional solid elements analyses using ANSYS
<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 *including dates*	
	Weight
CATIA and ANSYS analyses	20
Test #1 (2hours; includes FEA using CATIA)	15
Test #2 (2hours; includes topics covered in weeks 3-7)	30
Final examination (3 hours, comprehensive)	35
TOTAL	100%
Percentage grades will be converted to letter grades and grade points per the University calendar.	
5. LEARNING OUTCOMES	
1. Apply mathematics, science and engineering to design	
2. Learn the mathematical formulation of the finite element method	
3. Perform engineering analyses to machine systems	
4. Apply finite element tools for the analysis, design, and optimization of engineering systems	
5. Solve structural- and thermal- engineering problems using the finite element approach	
6. Provide hands-on experience using finite element software methods to model, analyze and design mechanical, thermal, and automotive systems	
6. POLICIES	
Anti-Discrimination	
<p>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.</p> <p>http://www.mcmaster.ca/policy/General/HR/Anti-Discrimination%20policy.pdf</p>	
Academic Integrity	
<p>You are required to exhibit honestly and use ethical behaviour in all aspects of the learning process. Academic credentials you earn are rooted in principles of honesty and academic integrity.</p> <p>Academic dishonesty is to knowingly act or 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.</p> <p>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.</p> <p>The following illustrates only three forms of academic dishonesty:</p> <ol style="list-style-type: none"> 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.)	
<p>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 <u>cannot</u> be used during any final examination period.</p>	

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>