University of Windsor
Program Development Committee

***5.28** **Engineering - Summary of Minor Course and Calendar Changes**

Item for: **Information**

Forwarded by: **Faculty of Engineering**

PART A

Please indicate with an "X" whether this change will be made to the undergraduate calendar or the graduate calendar, or both.	
X	The changes below, minor and largely editorial, will be made to the **Undergraduate Calendar**. These changes required no new resources.
__	The changes below, minor and largely editorial, will be made to the **Graduate Calendar**. These changes required no new resources.

When will these proposed change(s) be effective? [include semester and year]**:**	Fall 2014

PART B

Please list the course number and indicate with an "X" the changes that are being made. Add rows to the table as required. Full details on the proposed change(s) are to be provided in Part C.

Current course number	Deleting courses which are not part of any program's degree requirements*	Course calendar description changes	Pre/anti/co-requisite changes	Contact hour/ laboratory requirement changes	Course title changes	Renumbering courses	Cross-listing courses
06-85-212					x		
06-85-219					x		
06-92-311		x			x		
06-92-321					x		
06-92-453		x			x		
06-92-229	x						
06-92-452	x						
06-85-133		x					
06-85-230		x		x			
06-85-218		x					
06-92-450		x					
06-85-120		x	x				
06-92-315			x				
06-92-324			x				
06-92-328			x				
06-92-400			x				
06-92-411		x	x				
06-92-418			x				
06-92-428			x				

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Current course number	Deleting courses which are not part of any program's degree requirements*	Course calendar description changes	Pre/anti/co-requisite changes	Contact hour/ laboratory requirement changes	Course title changes	Renumbering courses	Cross-listing courses
06-92-440			x				
06-92-441			x				
06-92-451			x				
06-92-455			x				
06-94-330			x	x			
06-94-440			x				
06-94-441			x				
06-94-461		x	x				
06-94-463			x				
06-94-469			x				
06-94-370		x	x				
06-94-371			x				
06-94-470			x				
06-94-471		x	x				
06-94-472			x				
06-89-330			x				
06-89-331			x				
06-89-420			x				
06-89-421			x				
06-89-432		x	x				
06-89-433			x				
06-89-434			x				
06-89-440			x				
06-89-441		x	x				
06-89-450		x	x				
3 additional changes regarding course positioning within or formatting of the on-line course listing							

**If the deleted course was a required course in any program, the proposed deletion must be presented on a PDC Form C.*

PART C

Please provide the current and the proposed new course information by cutting and pasting from the current undergraduate or graduate web calendar (www.uwindsor.ca/calendars) and clearly marking deletions with strikethrough (~~strikethrough~~) and additions/new information with bolding and underlining.

For contact hour/laboratory requirement changes which do not always appear in the calendar, please type in the current information and clearly mark deletions with strikethrough (~~strikethrough~~) and additions/new information with bolding and underlining.

Example: **03-101. University Senates ~~– Role and Power~~** This course explores the history, role, and power of Senates in Canadian universities. ~~(Also offered as 04-101.)~~ (Prerequisite: 03-100.) ~~2 lecture hours and 1 tutorial hour per week~~ **3 lecture hours/week**

Preface to the changes:

These changes are being made largely in response to the upcoming accreditation visit in Winter 2015. They are primarily editorial or housekeeping in nature. This is particularly true of the large number of changes for pre-

requisites, most of which tighten up the path to keep 2nd year students from taking 4th year electives. Some course description changes have been allowed to emphasize a list of topics rather than a lengthy description of the course. These description changes, however, are not intended to change the nature of the course material or learning outcomes. Course name changes reflect either: the deletion of numbering where the second course in the sequence is no longer offered; opting for the word "Fundamentals" over "Introduction to"; or updating to the current industry terminology, as in "Heating, Ventilation, & Air Conditioning" rather than just "Air Conditioning."

COURSE TITLE CHANGES (plus updating the description of 2 courses)

06-85-212. Thermodynamics ~~1~~ [change: delete the 1]

06-85-219. ~~Introduction to~~ Engineering Materials **Fundamentals**

06-92-311. Stress Analysis ~~1~~ [change: delete the 1]

~~Combined loading, stress and strain transformations, Mohr's circle in 3-D, stress concentration, theory of failure, energy methods, shear flow in bending, composite beams.~~ Analysis of stresses and strains in simple mechanical structures subjected to combinations of axial, torsion and flexural loads; two-dimensional transformations of stress and strain components; yield and fracture criteria; deflection of statically determinate and indeterminate beams; buckling of columns with various end conditions; introduction to energy methods. (Prerequisite: 85-218 or 87-227.) (3 lecture, 2 laboratory/tutorial hours a week.)

06-92-321. Control Theory ~~1~~ [change: delete the 1]

06-92-453. **Heating, Ventilation, and** Air Conditioning

~~Principles of environmental comfort control, applied psychrometrics, load calculations, air distribution system design.~~ **Principles of environmental air quality and occupant comfort control. Psychrometric analysis of buildings as applied to common air distribution system designs. Current solar radiation estimation techniques and other energy transfer mechanisms; their application to cooling and heating load calculations. Analytical and numerical calculations. Computational tools.** (Prerequisite: 92-317.) (3 lecture, 1 laboratory/tutorial hours a week.)

COURSE DELETIONS

06-92-229 Electric Motors [deleted from the required program in 2008 via PDC forms]

06-92-452 Computational Thermo-Fluids

CHANGE IN COURSE DESCRIPTION ONLY

85-133. Engineering and Design

~~The Engineering and Design course is the introductory engineering design course for First Year Engineering students. The course activities are aimed at integrating knowledge regarding information retrieval techniques, problem needs validation, problem identification and formulation, analysis of the problem, and problem solving techniques. Furthermore, the students will brainstorm different solutions for the design problems and will present their ideas through a variety of visual, written, and oral communications. Specifically, they will need to apply what they will be taught in visualization techniques, including but not limited to sketching, isometric drawing and orthographic projection. The students will focus on introductory engineering problems from a variety of disciplines or scenarios as appropriate, and will work in groups to encourage and develop personal, teamwork, leadership, and task completion skills.~~

Introductory engineering design course. Visualization techniques, graphical communication using sketching, isometric drawings, orthographic projection, section views, auxiliary views and descriptive geometry. Drafting portfolio. Design portfolio consisting of open-ended problems: problem identification and formulation; analysis of the problem; problem solving techniques; graphical communication of the solution. Includes group work to develop personal, teamwork, leadership, and task completion skills. (3 lecture, 3 laboratory hours a week.) Credit Weight 4.5

85-218 Mechanics of Deformable Bodies

~~An introduction~~ **Introduction** to stress, strain, ~~and~~ stress-strain relations, **and** mechanical ~~properties and types of~~

~~loads~~. A study of ~~members~~ **simple structures** subjected to **either** axial load, flexure, and torsion, including flexure ~~and deflection~~ of beams, eccentric loads, ~~connections, experimental determination of principal stresses, and buckling of columns.~~ **shear and bending moment diagrams, shearing streses in beams.** Additional topics may include statically indeterminate problems ~~and inelastic responses~~. (Prerequisites: 85-111 and 62-140.) (3 lecture, 3 laboratory/tutorial hours per week.) (Credit cannot be obtained for both 85-218 and 85-217, or 85-218 and 87-227.) Credit Weight 4.5

85-230. Advanced Engineering and Design
Computer aided design applications for engineering graphic communication~~, building on concepts undertaken in Engineering and Design, such as orthographic projection; isometric drawing sections and conventions; dimensioning; engineering drawings and prints; and descriptive geometry. Advanced use of computer graphics, with optional topics such as geometric tolerancing and information systems~~. **Solid modeling; orthographic projection and isometric drawing; sections and conventions; dimensioning and tolerancing. Design portfolio and project. (Prerequisite: 85-133)** (~~1 lecture hour, 3 laboratory~~ **4 lecture/laboratory** hours a week.) (Credit cannot be obtained for both 85-130 and 85-230.) Credit Weight ~~2.5~~ 3.5.

> **NOTE for 85-230:** The laboratory work and lecture distinction for this course is not standard; the two are blended. The credit weight should be 3.5.

92-450. Gas Dynamics
~~Basic concepts and flow equations, one dimensional flows, isentropic flows in variable area ducts, constant area duct flows, Fanno and Rayleigh lines, normal shock, nozzles and diffusers, oblique shock, measurements.~~ **Basic concepts and one-dimensional flow equations of gas dynamics. Emphasis on isentropic flows in variable area ducts as well as Fanno, Rayleigh and Isothermal flows in constant area ducts. Normal shock waves, their appearance in various flow types, their application in nozzles and diffusers. Oblique shock and Prandtl Meyer expansion waves. Considerations in compressible flow measurements.** (Prerequisite: 92-320.) (3 lecture, 1 laboratory/tutorial hours a week.)

PREREQUISITE CHANGES (with description changes as noted)

> Note: Most of these prerequisite changes are associated with limiting the electives to a particular semester standing.

85-120. Engineering Thermofluids
~~The Engineering Thermofluids courses examines the fundamentals of thermodynamics, fluid mechanics, and heat transfer. Students will learn the appropriate terminology and units, the sources of and types of energy and their interchange, the types of fluid flow and heat transfer and the physical and thermal properties of fluids. The course will consider and explain everyday, engineering examples of these systems, as well as demonstrate how to identify, formulate and solve basic problems using the fundamental laws of thermofluids. Laboratory based experiments will be introduced to illustrate these topics in practical situations. (Prior knowledge from Physics I (64-140) is recommended.)~~
Introductory thermodynamics, fluid mechanics, and heat transfer. Terminology and units; sources of and types of energy and their interchange; types of fluid flow and heat transfer; physical and thermal properties of fluids. Solution of basic problems using laws of thermofluids; exploration of common thermofluid systems. Includes demonstrations and laboratory-based experiments. (Prior knowledge from 85-111 or 64-140 is recommended.) (3 lecture, 2 tutorial/laboratory hours per week) Credit Weight 4.0

92-315. Mechanical Vibrations
Free, damped, and forced vibration of single and multi-degree of freedom systems with discrete masses. Exact and approximate methods of solution. Vibration isolation, vibration transducers, use of computers in vibration analysis. (Prerequisite: 92-210 **and Semester 6 or higher standing**.) (3 lecture, 2 tutorial hours a week.)

92-324. Engineering Measurements
Basic concepts in instrumentation; error analysis; instrumentation and measurement systems including sensors, transducer, signal conditioning and display; microcomputer-based data acquisition and analysis. (Prerequisite: 85-222 **or 65-205**.) (3 lecture, 1.5 laboratory/tutorial hours a week.)

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92-328. Heat Transfer
Introduction to the three heat transfer modes: conduction, convection, and radiation. Application of heat exchange equipment.(Prerequisite: ~~85-120~~ **62-216 and semester 6 or higher standing.**) (3 lecture, 2 laboratory hours a week.)

92-400. Capstone Design
Student design teams, operating within a "company" environment, utilize the broad range of their undergraduate experience in interdisciplinary projects selected to promote interaction between the mechanical, automotive, and materials programs. Design methodologies and team interaction simulate future professional practice. Project milestones include: a design proposal with cost analysis and scheduling, construction and commissioning of the designed appartus, and a final report and presentation having both global and detail completeness. (Prerequisite: **Semester 7 or higher standing.)** ~~4th-year standing; co-requisite: 92-411/92-421.) (Antirequisite: 92-410/92-420.) (2 lecture, 4 laboratory hours a week.)~~ (A**n** 8.00 credit weight, 2 semester course.)

92-411. Design for Failure Prevention
~~Static and fatigue loading failures. Threaded fasteners, pins and keys. Welded, brazed, and adhesive joints. Springs. Anti friction bearings, hydrodynamic lubrication. Student designed experiments will analyze component failures.~~ **Philosophy of machine design. Design factor/reliability relationships. Contemporary fatigue analysis, including low- and high-cycle, triaxial state of non-reversed stress and fatigue damage, with applications of selected mechanical elements.** (Prerequisites: ~~92-323 and 92-311, and fourth-year~~ **92-311, 92-323, and Semester 7 or higher** standing.) (3 lecture, 3 laboratory hours a week.)

> **NOTE for course 92-411 above:** The course descriptions on SIS and in the on-line calendar do not match. The correct description is given here; it matches the SIS system. The on-line calendar description has been crossed out.

92-418. Thermofluid Systems Design
Evaluation of major thermofluid systems: HVACandR, power generation. Factors affecting design and selection of thermofluid devices: boilers, pumps and compressors, valves, piping systems, heat exchangers, evaporators, and turbines. Effect of device characteristics on process efficiency. Application of optimization techniques to thermofluid systems. (Prerequisites: ~~92-317, 92-320 and 92-328.)~~ **85-212, 85-233, 92-328; and either 92-317 or 92-320.)**

92-428. Sustainability in Engineering
Environmental impact assessment. Biophysical and socioeconomic impacts from engineering activities, processes, and projects. Human health and environmental risk concepts. Introduction to life cycle analysis, corporate/industrial environmental management, and environmental management systems. Students will undertake various project related and problem-based assignments. (Cross-listed as 93-428.) **(Prerequisite: 85-250 and Semester 6 or higher standing.)** (3 lecture, 2 tutorial hours a week.)

92-440. Topics in Mechanical Engineering
Selected topics of current interest in Mechanical Engineering. (Prerequisite: 4th-year **Semester 7 or higher** standing or permission of instructor.) (3 lecture, 1 laboratory hour a week.)

92-441. Directed Studies in Mechanical Engineering
A special course of studies in Mechanical Engineering with content and direction approved by the Department Head. Although the course may not include formal lectures, it will carry the weight of three lecture hours and 1 laboratory hour per week. (Prerequisite: ~~4th-year~~ **Semester 7 or higher** standing with a ~~(B)~~ **70%** average or better.)

92-451. Turbomachines
Dimensional analysis and similitude; definitions of efficiency, two dimensional analysis of axial flow turbines and compressors, three dimensional flow, centrifugal pumps and compressors. (Prerequisite: **92-320** ~~92-450~~.) (3 lecture, 1 laboratory/tutorial hours a week.)

92-455. Environmental Effects and Control of Noise
Physical properties of sound and noise, measurement of noise, noise control, hearing characteristics and

environmental effects of noise. **(Prerequisite: Semester 7 or higher standing.)** (3 lecture, 1 tutorial/laboratory hours a week.)

94-330. Automotive Engineering Fundamentals
Overview of primary automotive systems. Engine types and configurations, combustion, emission control, vehicle performance. Powertrain, suspension, frame and chassis. Materials and fabrication issues. Engine and vehicle dissection laboratory. Identification of industry issues and trends. **(Prerequisite: Automotive Option students only and Semester 6 or higher standing.)** (2 lecture, ~~4~~ **3** laboratory hours a week.)

> **NOTE for course 94-330 above:** The laboratory hours on SIS and in the on-line calendar do not match. The correct number of lab hours (3) is given here; it matches the SIS system. The on-line calendar description has been crossed out.

94-440. Topics in Automotive Engineering
Selected topics of current interest in Automotive Engineering. (Prerequisite: ~~4th-year~~ **Semester 7 or higher** standing or permission of instructor.) (3 lecture, 1 laboratory hours a week.)

94-441. Directed Studies in Automotive Engineering
A special course of studies in Automotive Engineering with content and direction approved by the Department Head. Although the course may not include formal lectures, it will carry the weight of three lecture hours and 1 laboratory hour per week. (Prerequisite: ~~4th-year~~ **Semester 7 or higher** standing with a ~~(B)~~ **70%** average or better.)

94-461. Design for Manufacturability
Expansion of engineering ~~graphics to include statistical tolerance design,~~ **graphics: tolerance design; tolerances for precision fits; tolerance stack-up;** geometric dimensioning and tolerancing ~~(GD&T), schematics for standard components,~~ **(GD&T);** design for manufacture and assembly **(DFMA).** ~~(DFMA), reverse engineering, quality methods, and design morphology.~~ **(Prerequisites: 85-230 and Semester 7 or higher standing.)** (3 lecture, 1 laboratory hours a week.)

94-463. Vehicle Dynamics
Classification and analysis of suspension types and geometry, powertrain layout, and ride quality. Tire modeling, stability, and numerical simulation of vehicle dynamics, including longitudinal and lateral vehicle response to driver inputs. Selected topics from industry experts. (Prerequisite: ~~92-315~~ **Semester 7 or higher standing.) (Co-requisite: 92-315 or 92-321.)** (3 lecture, 1 tutorial hours a week.)

94-469. Diesel Engine Fundamentals
Theory and practice of modern diesel engines. Diesel combustion cycle. Engine design aspects including fuel injection, turbocharging, and intercooling. Measurement and control of engine emissions. Engine performance testing. Future and advanced technologies including exhaust aftertreatment. (Prerequisites: ~~Semester 6 standing and~~ 92-317 **and Semester 6 or higher standing**.)

94-370. Aerospace Engineering Fundamentals
~~History of flight and aircraft evolution. Major aircraft systems and components: Propulsion systems integration, Fluid power systems, Landing gear, Fatigue, safe life, damage tolerant design, Frame and shell structures; Monocoque structures, Avionics. Fundamentals of aerodynamics, aircraft performance, and avionics. Weight and cost estimation and control. System reliability calculations. Design studies of aircraft or spacecraft components. (Pre-requisites: 85-111, 85-233, 92-320)~~ **History of flight and aircraft evolution. Aircraft operating principles. Airfoil and wing aerodynamics. Aerospace propulsion systems (turbojets, turbofans, turboprops, and rockets). Lab on performance estimation and measurement for a turbojet engine. Aircraft design. Weight estimation. Aircraft systems. Aircraft materials and structures. Governance of aviation in North America. Design studies of aircraft or spacecraft and/or components thereof. (Prerequisites: 62-215, 62-216, semester 6 or higher standing; and Aerospace option students or permission of instructor.) (Co-requisites: 92-317, 92-320.)**

94-371. Aerospace Materials and Manufacturing
Properties and selection of metals, ceramics, polymers, and composite materials for aerospace applications.

Structural and gas-turbine alloys. Machining, casting, forming, heat treating, and joining processes for original manufacture and repair. Manufacture and application of composites. In-service materials degradation. (Pre-requisites: ~~85-111, 85-233, 92-320,~~ 94-370.)

94-470. Aerospace Propulsion
Application of gas dynamics and thermodynamics to aerospace engines. Analysis of engine cycles. Theory and design of propellers; turboprop engine analysis, Internal combustion and gas turbine engines. Component design for compressors, combustors, afterburners, exhaust nozzles. (Pre-requisites: ~~85-212, 92-317, 85-233, 92-320,94-370, 94-371, 94-471) Co-requisite: 94-472)~~ **92-317, 92-320, 94-370, and semester 7 or higher standing**.)

94-471. Aerodynamics and Performance
~~Airfoils and wing geometry. Wing forces: lift, drag, and moment. Fluid dynamics: viscosity, and compressibility. Stability and control. Detailed calculation of aircraft performance: range and load calculations; Manoeuvring loads and load factors.~~ **Analysis of aircraft configurations. Viscous and compressibility effects. Manoeuvering loads and load factors; implications of manoeuverability on thrust requirements. Aircraft stability and control.** (Pre-requisites: ~~85-111, 85-233,~~ 92-320, 94-370**, and Semester 7 or higher standing**.)

94-472. Flightworthiness
Maintenance, repair and overhaul of Commercial Aircraft, Review of aircraft systems, and the identification of repair and maintenance issues for each system. Canadian Aviation Regulations (CAR) and US Federal Aviation Regulations (FAR), Quality standards in the aircraft industry. Regulation and industrial practices in maintenance and repair activities. (Prerequisites: 94-370, 94-371, 94-471~~;~~**)** **(**Co-requisite~~s~~: 94-470)

89-330. Materials and Their Properties
The relationship of the engineering properties of materials to their atomic structure, bonding, crystal structure, imperfections and microstructure. The processing of materials to produce required structure and properties. Includes consideration of crystal structure determination, phase diagrams, diffusion, phase transformations, solidification, heat treatment and deformation. The laboratory is a term-long project designed to familiarize students with the use of materials-related equipment commonly found in industrial and research laboratories. (Prerequisite: 85-219 **and Semester 6 or higher standing**.) (3 lecture, 2 laboratory hours a week.)

89-331. Thermodynamics and Kinetics of Materials
Thermodynamics: review of First and Second Laws, gas laws, humidity, thermochemistry, entropy, reversible and irreversible processes, equilibrium criteria, Gibbs free energy, activity and activity coefficient, solution thermodynamics, Raoult's and Henry's Laws, Gibbs-Duhem equation, alloy phase equilibria, free energy-composition diagrams, Ellingham diagrams. Kinetics: empirical treatment for homogeneous reaction rates, reaction order and specific rate constant, activation energy, Arrhenius' Law, energy distribution in reacting systems, heterogeneous reactions. Selected problems in materials processing to illustrate theory. **(Prerequisites: 92-212 and Semester 7 or higher standing.**) (3 lecture, 2 laboratory hours a week.)

89-420. Ceramic Materials
Uses of traditional and advanced ceramics. Monolithic and composite ceramics. Comparison of ceramics with metals and alloys. Processing: raw material preparation, forming techniques, theory and practice of sintering, quality control. Properties: modulus of rupture, creep, corrosion, erosion, and electrical, magnetic and optical properties. **(Prerequisite: Semester 7 or higher standing.**) (3 lecture hours, 1 laboratory hours a week.)

89-421. Deformation and Fracture
Introduction to basic plasticity theory and its application to common metal forming and metal cutting processes. Fracture mechanics and its applications in brittle and ductile fracture, creep and fatigue, for purposes of design and of analysis. **(Prerequisite: 92-311 and Semester 7 or higher standing.**) (3 lecture, 2 laboratory hours a week.)

89-432. Modern Steels
An overview of developments in materials, manufacturing processes and applications for modern steels. Classes and classifications of steels, effects of alloy additions and control of microstructure. ~~In-depth studies of high strength low alloy (HSLA), dual-phase, ultra-high strength, stainless and tool steels. The laboratory is an individual assignment on one type of steel.~~ **Traditional and advanced high strength steels. Automotive**

sheet steels. Stainless and tool steels. Cast irons. Steel industry in Canada. Mechanical and microstructural characterization laboratories. (**Prerequisite: Semester 7 or higher standing.**) (3 lecture hours, 1 laboratory hour a week.)

89-433. Physical Metallurgical Processes
Application of diffusion theory to diffusion-controlled processes; solidification principles and application to foundry problems-segregation in castings; heat transfer processes. Selected problems to illustrate theory. **(Prerequisite: Semester 7 or higher standing.)** (3 lecture, 1 laboratory hour a week.)

89-434. Polymers
The structure, properties, and processing of polymers (plastics) with emphasis on polymer forming processes, including extrusion, injection molding, blowmolding, and thermoforming, including tours of local industry. Fabrication and properties of composites with a polymer base. **(Prerequisite: Semester 7 or higher standing.)** (3 lecture hours, 1 laboratory hour a week.)

89-440. Topics in Materials Engineering
Selected topics of current interest in Materials Engineering. (Prerequisites: ~~4th year~~ **Semester 7 or higher** standing or permission of instructor.) (3 lecture, 1 laboratory hours a week.)

89-441. Directed Studies in Materials Engineering
A special course of studies in Materials Engineering with content and direction approved by the Department ~~Hhair~~ **Head**. Although the course may not include formal lectures, it will carry the weight of three lecture hours and 1 laboratory hour per week. (Prerequisites: ~~4th year~~ **Semester 7 or higher** standing with a ~~(B)~~ **70%** average or better.) (3 lecture hours, 1 laboratory hour a week.)

89-450. Welding Engineering
~~Arc welding processes, filler metal selection, welding procedure specification and qualification per ASME, CSA, and AWS codes. Weld and joint types, calculation of weld size and stress, design for fatigue prevention, weld discontinuities, non-destructive test methods, mechanical property evaluation. Solidification and welding metallurgy, base metal classification, hydrogen-assisted cracking and its control, use of preheat and postweld heat treatments, weldability, fabrication issues~~. **Design and qualification of arc welding procedures to met the requirements of the ASME Boiler and Pressure Vessel Code. Arc welding processes, weld discontinuities, mechanical and non-destructive testing. Welding metallurgy, base and filler metal classification. Control of hydrogen-assisted cracking, preheat and postweld heat treatment. Fabrication issues. Canadian and international welding codes. (Prerequisite: Semester 7 or higher standing.)** (3 lecture, 1 laboratory hours a week.)

CHANGES TO ON-LINE COURSE PLACEMENT OR FORMAT
Move the course 92-315 Mechanical Vibrations **from** under the heading MECHANICAL ENGINEERING **to** under the heading MECHANICAL TECHNICAL ELECTIVES. It should appear above the course 92-412.

Leave the course listing for 92-418 Thermofluid Systems Design under the heading MECHANICAL ENGINEERING; **remove** its course listing from under the heading MECHANICAL TECHNICAL ELECTIVES.

Remove the heading ~~*MATERIALS OPTION TECHNICAL ELECTIVES*~~ from the on-line calendar. It occurs between the listing for courses 89-412 and 89-432.

Part D

Please indicate with an "X".	
Will the proposed changes result in changes to the learning outcomes of the course(s)?	
___	Yes. **If so, please complete the learning outcomes form and append new learning outcomes, as appropriate, to this Form E submission. (See attached for learning outcomes form))**
X	No.