Engineering Faculty Council
Faculty of Engineering and Applied Science

Motion EFC_2017_14 through EFC_2017_18
APPROVED

Motion: To approve a Minor Program Adjustment for Automotive, Manufacturing, Mechanical (Comprehensive), Mechanical (Energy) and Mechatronics Engineering and their corresponding Engineering and Management programs.

i.   Remove *MANE 3120U: Thermo-mechanical Processing of Materials* from Year 3, Semester 1 of program map for Mechanical Engineering, Mechanical Engineering – Energy Specialization, Automotive Engineering, and their corresponding Management programs, and update the course description and major topics for the course as a whole. (EFC_2017_14)

ii.   Add *MANE 3120U: Thermo-mechanical Processing of Materials* to list of Engineering Electives offered to Mechanical Engineering, Mechanical Engineering – Energy Specialization, and Automotive Engineering. (EFC_2017_15)

iii. Approve new course *MECE 3420U: Solid Mechanics II* and add to Year 3, Semester 1, of program map for Mechanical Engineering, Mechanical Engineering – Energy Specialization, Automotive Engineering, and their corresponding Management programs. (EFC_2017_16)

iv.   In *MECE 4210U: Advanced Solid Mechanics and Stress Analysis,* reduce lecture hours from 4 hours to 3 hours, change pre-requisites, and update course description and major topics to accurately cover what is being taught. (EFC_2017_17)

v.   Remove *MECE 4210U: Advanced Solid Mechanics and Stress Analysis* from the list of Engineering Electives offered to Mechatronics Engineering students. (EFC_2017_18)

Minor Program Adjustment

Faculty: Faculty of Engineering and Applied Science	**Date**: November 15, 2017
Program: Mechanical Engineering, Mechanical Engineering – Energy Specialization, Automotive Engineering, Manufacturing Engineering, and Mechatronics Engineering	
Undergraduate: X	**Graduate**: ☐

Minor Program Adjustments include: New required courses, Deletion of required courses, Other changes to degree requirements or program learning outcomes, New academic requirements or changes to existing requirements.

Motion: That CPRC approve the Minor Program Adjustment for Automotive, Manufacturing, Mechanical (Comprehensive), Mechanical (Energy) and Mechatronics Engineering and their corresponding Management programs.

a. Remove *MANE 3120U: Thermo-mechanical Processing of Materials* from Year 3, Semester 1 of program map for Mechanical Engineering, Mechanical Engineering – Energy Specialization, Automotive Engineering, and their corresponding Management programs, and update the course description and major topics for the course as a whole. (EFC_2017_14)

b. Add *MANE 3120U: Thermo-mechanical Processing of Materials* to list of Engineering Electives offered to Mechanical Engineering, Mechanical Engineering – Energy Specialization, and Automotive Engineering. (EFC_2017_15)

c. Approve new course *MECE 33420U: Solid Mechanics II* and add to Year 3, Semester 1, of program map for Mechanical Engineering, Mechanical Engineering – Energy Specialization, Automotive Engineering, and their corresponding Management programs. (EFC_2017_16)

d. In *MECE 4210U: Advanced Solid Mechanics and Stress Analysis,* reduce lecture hours from 4 hours to 3 hours, change pre-requisites, and update course description and major topics to accurately cover what is being taught. (EFC_2017_17)

e. Remove *MECE 4210U: Advanced Solid Mechanics and Stress Analysis* from the list of Engineering Electives offered to Mechatronics Engineering students. (EFC_2017_18)

Rationale for changes: These changes are being recommended after a thorough review of the solid mechanics stream, based on comments made by students and course instructors. Progression of content coverage in related courses in this stream have been modified to enable a steady progression in learning outcomes.

Proposal Brief

Summary of the proposed change (for pathways, please include details on the specific or unspecified transfer credits students will receive, if applicable)
MECE 3420U – Solid Mechanics II will replace *MANE 3120U – Thermo-mechanical Processing of Materials* in the program map for Mechanical Engineering, Mechanical Engineering – Energy Specialization, and Automotive Engineering.

Description of the ways in which the proposed change will enhance the program and/or opportunities for students

These changes are being recommended after a thorough review of the solid mechanics stream, based on comments made by students and course instructors. Progression of content coverage in related courses in this stream have been modified to enable a steady progression in learning outcomes. They will allow space in the Automotive, Mechanical, and Mechanical – Energy Engineering specialization program maps for an intermediate Solid Mechanics course in the stream, which will support students in the transition between *MECE 2420U - Solid Mechanics I* in Year 2 and *MECE 4210U – Advanced Solid Mechanics and Stress Analysis* in Year 4.

Process of consultation with other units if the change(s) involves students, staff, and/or faculty from other programs or courses
This change was discussed with all Program Curriculum Committees.

Analysis of financial and enrolment implications
1 Course Load increase for the AMME Department

Proposed Implementation Date (state term, e.g. Fall 2017)
Implementation will begin to take effect Fall 2018 and onwards.

Transition Plan (include a plan for all current students in the program, by year level)
- For all programs, change to content in *MANE 3120U – Thermo-mechanical Processing of Materials* will take effect Fall 2018
- For Mechanical Engineering and Automotive Engineering students, those starting Year 1 in Fall 2017 will:
    o take the new MECE 2420U – Solid Mechanics I in Winter 2019
    o take the new MECE 3420U – Solid Mechanics II in Fall 2019
    o take the new MECE 4210U – Advanced Solid Mechanics and Stress Analysis in Fall 2020
- For Mechanical Engineering – Energy Specialization students, those starting Year 1 in Fall 2017 will:
    o take the new MECE 2420U – Solid Mechanics I in Winter 2019
    o take the new MECE 3420U – Solid Mechanics II in Fall 2019
- For Mechanical Engineering and Automotive Engineering students, those starting Year 2 in Fall 2017 will:
    o take the new MECE 3420U – Solid Mechanics II in Fall 2018
    o take the new MECE 4210U – Advanced Solid Mechanics and Stress Analysis in Fall 2019
- For Mechanical Engineering – Energy Specialization students, those starting Year 2 in Fall 2017 will:
    o take the new MECE 3420U – Solid Mechanics II in Fall 2018

Calendar Copy and/or Program Maps (highlight revisions to existing curriculum)

Automotive Engineering
The following are approved courses as engineering electives:
- ENGR 3160U – Engineering Operations and Project Management
- MANE 3120U – Thermo-mechanical Processing of Materials
- MANE 3300U – Integrated Manufacturing Systems
- MANE 3460U – Industrial Ergonomics
- MANE 4160U – Artificial Intelligence in Engineering

- MANE 4190U – Principals of Material Removal Processes
- MANE 4380U – Life Cycle Engineering
- MECE 3260U – Introduction to Energy Systems
- MECE 3410U – Electro-Mechanical Energy Conversion
- MECE 4240U – Applied Thermal and Fluids Engineering
- MECE 4250U – Advanced Materials Engineering
- MECE 4290U – Finite Element Methods

Mechanical Engineering

The following are approved courses as engineering electives:
- AUTE 3010U – Introduction to Automotive Engineering
- ENGR 3160U – Engineering Operations and Project Management
- ENGR 4540U – Energy Efficiency, Management and Simulation
- MANE 3120U – Thermo-mechanical Processing of Materials
- MANE 3300U – Integrated Manufacturing Systems
- MANE 3460U – Industrial Ergonomics
- MANE 4045U – Quality Control
- MANE 4160U – Artificial Intelligence in Engineering
- MANE 4190U – Principals of Material Removal Processes
- MANE 4380U – Life Cycle Engineering
- MECE 3260U – Introduction to Energy Systems
- MECE 3410U – Electro-Mechanical Energy Conversion
- MECE 4250U – Advanced Materials Engineering
- MECE 4290U – Finite Element Methods

Mechanical Engineering – Energy Specialization

The following are approved courses as Engineering electives:
- AUTE 3010U – Introduction to Automotive Engineering
- ENGR 3160U – Engineering Operations and Project Management
- ENGR 4540U – Energy Efficiency, Management and Simulation
- MANE 3120U – Thermo-mechanical Processing of Materials
- MANE 3300U – Integrated Manufacturing Systems
- MANE 3460U – Industrial Ergonomics
- MANE 4045U – Quality Control
- MANE 4160U – Artificial Intelligence in Engineering
- MANE 4190U – Principals of Material Removal Processes
- MECE 3210U – Mechanical Vibrations
- MECE 4250U – Advanced Materials Engineering
- MECE 4290U – Finite Element Methods

Mechatronics Engineering

The following are approved courses as engineering electives:
- AUTE 3010U Introduction to Automotive Engineering
- ENGR 3160U Engineering Operations and Project Management++
- ENGR 3170U Engineering Production Management++
- ENGR 4540U Energy Efficiency, Management and Simulation
- MANE 3190U Manufacturing and Production Processes
- MANE 3300U Integrated Manufacturing Systems
- MANE 3460U Industrial Ergonomics
- MANE 4045U Quality Control
- MANE 4160U Artificial Intelligence in Engineering
- MANE 4380U Life Cycle Engineering
- MECE 3260U Introduction to Energy Systems
- ~~MECE 4210U Advanced Solid Mechanics and Stress Analysis~~

- MECE 4240U Applied Thermal and Fluids Engineering
- MECE 4250U Advanced Engineering Materials
- MECE 4290U Finite Element Methods
- METE 4300U Introduction to Mobile Robotics

APPROVAL DATES

Program Curriculum Committee approval	Automotive Engineering – November 15, 2017 Manufacturing Engineering – November 15, 2017 Mechanical Engineering (including Energy Specialization) – November 15, 2017 Mechatronics Engineering – November 15, 2017
Department Council approval	November 20, 2017
Engineering Curriculum Committee approval	November 22, 2017
Engineering Faculty Council approval	December 6, 2017
CPRC Approval	19 January 2018
Submission to Academic Council	27 February 2018

Current Program Maps – MANE 3120U to be removed – highlighted in red

Mechanical Engineering 2017-2018					
Year	Course	Course	Course	Course	Course	Course
1-1	COMM 1050U Technical Communications	ENGR 1015U Introduction to Engineering	MATH 1010U Calculus I	MATH 1850U Linear Algebra for Engineers (Coreq: MATH 1010U)	PHY 1010U Physics I	
1-2	CHEM 1800U Chemistry for Engineers (Credit restrictions: CHEM 1010U/ CHEM 1020U)	ENGR 1025U Engineering Design (ENGR 1015U)	ENGR 1200U Introduction to Programming for Engineers (Credit Restriction: INFR 1100U)	MATH 1020U Calculus II (MATH 1010U)	PHY 1020U Physics II (PHY 1010U)	SSCI 1470U Impact of Science and Technology on Society
2-1	MANE 2220U Structure and Properties of Materials (CHEM 1800U)	MATH 2860U Differential Equations for Engineers (MATH 1020U, Coreq: MATH 1850U)	MECE 2230U Statics (MATH 1020U, PHY 1010U)	MECE 2310U Concurrent Engineering and Design (ENGR 3200U or ENGR1025U)	MECE 2320U Thermodynamics (PHY 1010U)	
2-2	ELEE 2790U Electric Circuits (MATH 1020U, MATH 1850U, PHY 1020U)	MATH 2070U Numerical Methods (MATH 1020U, MATH 1850U or MATH 2050U)	MECE 2420U Solid Mechanics (MECE 2230U)	MECE 2430U Dynamics (MATH 1850U, MECE 2230U)	MECE 2860U Fluid Mechanics (PHY 1010U, MATH 1020U)	STAT 2800U Statistics and Probability for Engineers (MATH 1020U)
3-1	MANE 3120U Thermo-mechanical Processing of Materials (MANE 2220U)	MANE 3190U Manufacturing and Production Processes (MANE 2220U)	MECE 3030U Computer-Aided Design (MECE 2310U, MECE 2420U)	MECE 3270U Kinematics and Dynamics of Machines (MECE 2430U or ENGR 2020U)	MECE 3350U Control Systems (ELEE 2790U or ENGR/ELEE 2210U, MATH 2860U)	Liberal Studies Elective
3-2	ENGR 3360U Engineering Economics	MECE 3210U Mechanical Vibrations (MECE 2430U or ENGR 2020U)	MECE 3220U Machine Design (MECE 3270U, MECE 2310U, MECE 2420U)	MECE 3390U Mechatronics (MECE 3270U, MECE 3350U)	MECE 3930U Heat Transfer (MECE 2320U or ENGR 2010U or MECE 2640U)	MECE 4240U Applied Thermal & Fluids Engineering (MECE 2320U or MECE 2640U, MECE 2860U)
4-1	ENGR 4760U Ethics, Law and Professionalism for Engineers	ENGR 4950U Capstone Systems Design for Mechanical, Automotive, Mechatronics and Manufacturing Engineering I (Successful completion of all non-elective courses in year three)	MANE 4280U Robotics & Automation (ENGR/MECE 3350U)	MECE 4210U Advanced Solid Mechanics and Stress Analysis (MECE 3220U)	Engineering Elective	Liberal Studies Elective
4-2	ENGR 4951U Capstone Systems Design for Mechanical, Automotive, Mechatronics and Manufacturing Engineering II (ENGR 4950U)	Engineering Elective	Engineering Elective	Engineering Elective		

Mechanical Engineering: Energy Option 2017-2018

Year	Course	Course	Course	Course	Course	Course
1-1	COMM 1050U Technical Communications	ENGR 1015U Introduction to Engineering	MATH 1010U Calculus I	MATH 1850U Linear Algebra for Engineers (Coreq: MATH 1010U)	PHY 1010U Physics I	
1-2	CHEM 1800U Chemistry for Engineers (Credit restrictions: CHEM 1010U/ CHEM 1020U)	ENGR 1025U Engineering Design (ENGR 1015U)	ENGR 1200U Introduction to Programming for Engineers (Credit Restriction: INFR 1100U)	MATH 1020U Calculus II (MATH 1010U)	PHY 1020U Physics II (PHY 1010U)	SSCI 1470U Impact of Science and Technology on Society
2-1	MANE 2220U Structure and Properties of Materials (CHEM 1800U)	MATH 2860U Differential Equations for Engineers (MATH 1020U, Coreq: MATH 1850U)	MECE 2230U Statics (MATH 1020U,PHY 1010U)	MECE 2310U Concurrent Engineering and Design (ENGR 3200U or ENGR 1025U)	MECE 2320U Thermodynamics (PHY 1010U)	
2-2	ELEE 2790U Electric Circuits (MATH 1020U, MATH 1850U, PHY 1020U)	MATH 2070U Numerical Methods (MATH 1020U, MATH 1850U or MATH 2050U)	MECE 2420U Solid Mechanics (MECE 2230U)	MECE 2430U Dynamics (MATH 1850U, MECE 2230U)	MECE 2860U Fluid Mechanics (PHY 1010U, MATH 1020U)	STAT 2800U Statistics and Probability for Engineers (MATH 1020U)
3-1	MANE 3120U Thermo-mechanical Processing of Materials (MANE 2220U)	MANE 3190U Manufacturing and Production Processes (MANE 2220U)	MECE 3030U Computer-Aided Design (MECE 2310U, MECE 2420U)	MECE 3260U Introduction to Energy Systems (MECE 2320U or ENGR 2010U or MECE 2640U, ENVS 1000U or ENGR 1015U)	MECE 3270U Kinematics and Dynamics of Machines (MECE 2430U or ENGR 2020U)	MECE 3350U Control Systems (ELEE 2790U or ENGR/ELEE 2210U, MATH 2860U)
3-2	AUTE 3450U Combustion and Engines (CHEM 1800U, MECE 2320U or MECE 2640U)	ENGR 3360U Engineering Economics	MECE 3220U Machine Design (MECE 3270U, MECE 2310U, MECE 2420U)	MECE 3320U Fluid Power Systems (MECE 2860U, MECE 3350U)	MECE 3930U Heat Transfer (MECE 2320U or ENGR 2010U or MECE 2640U)	MECE 4240U Applied Thermal & Fluids Engineering (MECE 2320U or MECE 2640U, MECE 2860U)
4-1	ENGR 4760U Ethics, Law and Professionalism for Engineers	ENGR 4950U Capstone Systems Design for Mechanical, Automotive, Mechatronics and Manufacturing Engineering I (Successful completion of all non-elective courses in year three)	MANE 4380U Life Cycle Engineering (MECE 3030U)	MECE 4430U Sustainable and Alternative Energy Technologies (MECE 4240U)	MECE 4410U Fossil Fuel Energy Conversion (MECE 3260U)	Liberal Studies Elective
4-2	ENGR 4951U Capstone Systems Design for Mechanical, Automotive, Mechatronics and Manufacturing Engineering II (ENGR 4950U)	MECE 3410U Electro-Mechanical Energy Conversion (ELEE 2790U, MECE 2320U or MECE 2640U)	MECE 4450U Thermal Environmental Engineering (MECE 4240U)	Engineering Elective	Engineering Elective	Liberal Studies Elective

Automotive Engineering 2017-2018

Year	Course	Course	Course	Course	Course	Course
1-1	COMM 1050U Technical Communications	ENGR 1015U Introduction to Engineering	MATH 1010U Calculus I	MATH 1850U Linear Algebra for Engineers (Coreq: MATH 1010U)	PHY 1010U Physics I	
1-2	CHEM 1800U Chemistry for Engineers (Credit restrictions: CHEM 1010U/CHEM 1020U)	ENGR 1025U Engineering Design (ENGR 1015U)	ENGR 1200U Introduction to Programming for Engineers (Credit Restriction: INFR 1100U)	MATH 1020U Calculus II (MATH 1010U)	PHY 1020U Physics II (PHY 1010U)	SSCI 1470U Impact of Science and Technology on Society
2-1	MANE 2220U Structure and Properties of Materials (CHEM 1800U)	MATH 2860U Differential Equations for Engineers (MATH 1020U, Coreq: MATH 1850U)	MECE 2230U Statics (MATH 1020U, PHY 1010U)	MECE 2310U Concurrent Engineering and Design (ENGR 3200U or ENGR 1025U)	MECE 2640U Thermodynamics and Heat Transfer (MATH 1020U, PHY 1010U)	Liberal Studies Elective
2-2	ELEE 2790U Electric Circuits (MATH 1020U, MATH 1850U, PHY 1020U)	MATH 2070U Numerical Methods (MATH 1020U, MATH 1850U or MATH 2050U)	MECE 2420U Solid Mechanics (MECE 2230U)	MECE 2430U Dynamics (MATH 1850U, MECE 2230U)	MECE 2860U Fluid Mechanics (PHY 1010U, MATH 1020U)	STAT 2800U Statistics and Probability for Engineers (MATH 1020U)
3-1	AUTE 3010U Introduction to Automotive Engineering (MECE 2230U)	MANE 3120U Thermomechanical Processing of Materials (MANE 2220U)	MANE 3190U Manufacturing and Production Processes (MANE 2220U)	MECE 3030U Computer Aided-Design (MECE 2310U, MECE 2420U)	MECE 3270U Kinematics and Dynamics of Machines (MECE 2430U or ENGR 2020U)	MECE 3350U Control Systems (ELEE 2790U or ENGR/ELEE 2210U, MATH 2860U)
3-2	AUTE 3290U Powertrain Design (AUTE 3010U, MECE 3270U)	AUTE 3450U Combustion and Engines (CHEM 1800U, MECE 2320U or MECE 2640U)	ENGR 3360U Engineering Economics	MECE 3210U Mechanical Vibrations (MECE 2430U or ENGR 2020U)	MECE 3220U Machine Design (MECE 3270U, MECE 2310U, MECE 2420U)	MECE 3390U Mechatronics (MECE 3270U, MECE 3350U)
4-1	AUTE 4010U Vehicle Dynamics and Control (MECE 3210U, ENGR 4260U or AUTE 3010U)	AUTE 4060U Automotive Structural Design (AUTE 3010U or ENGR 4260U, MECE 3220U)	AUTE 4070U Chassis Systems Design (AUTE 3010U or ENGR 4260U, MECE 3270U)	ENGR 4950U Capstone Systems Design for Mechanical, Automotive, Mechatronics and Manufacturing Engineering I (Successful completion of all non-elective courses in year three)	MECE 4210U Advanced Solid Mechanics and Stress Analysis (MECE 3220U)	Engineering Elective
4-2	ENGR 4760U Ethics, Law and Professionalism for Engineers	ENGR 4951U Capstone Systems Design for Mechanical, Automotive, Mechatronics and Manufacturing Engineering II (ENGR 4950U)	MANE 4045U Quality Control (STAT 2800U)	Engineering Elective	Engineering Elective	Liberal Studies Elective

Proposed Program Maps – MECE 3420U – Solid Mechanics II added – highlighted in green (note MECE 3xxxU = MECE 3420U)

Mechanical Engineering 2017-2018					
Year	Course	Course	Course	Course	Course	Course
1-1	COMM 1050U Technical Communications	ENGR 1015U Introduction to Engineering	MATH 1010U Calculus I	MATH 1850U Linear Algebra for Engineers (Coreq: MATH 1010U)	PHY 1010U Physics I	
1-2	CHEM 1800U Chemistry for Engineers (Credit restrictions: CHEM 1010U/ CHEM 1020U)	ENGR 1025U Engineering Design (ENGR 1015U)	ENGR 1200U Introduction to Programming for Engineers (Credit Restriction: INFR 1100U)	MATH 1020U Calculus II (MATH 1010U)	PHY 1020U Physics II (PHY 1010U)	SSCI 1470U Impact of Science and Technology on Society
2-1	MANE 2220U Structure and Properties of Materials (CHEM 1800U)	MATH 2860U Differential Equations for Engineers (MATH 1020U, Coreq: MATH 1850U)	MECE 2230U Statics (MATH 1020U, PHY 1010U)	MECE 2310U Concurrent Engineering and Design (ENGR 3200U or ENGR1025U)	MECE 2320U Thermodynamics (PHY 1010U)	
2-2	ELEE 2790U Electric Circuits (MATH 1020U, MATH 1850U, PHY 1020U)	MATH 2070U Numerical Methods (MATH 1020U, MATH 1850U or MATH 2050U)	MECE 2420U Solid Mechanics I (MECE 2230U)	MECE 2430U Dynamics (MATH 1850U, MECE 2230U)	MECE 2860U Fluid Mechanics (PHY 1010U, MATH 1020U)	STAT 2800U Statistics and Probability for Engineers (MATH 1020U)
3-1	MECE 3XXXU Solid Mechanics II (MECE 2420U)	MANE 3190U Manufacturing and Production Processes (MANE 2220U)	MECE 3030U Computer-Aided Design (MECE 2310U, MECE 2420U)	MECE 3270U Kinematics and Dynamics of Machines (MECE 2430U or ENGR 2020U)	MECE 3350U Control Systems (ELEE 2790U or ENGR/ELEE 2210U, MATH 2860U)	Liberal Studies Elective
3-2	ENGR 3360U Engineering Economics	MECE 3210U Mechanical Vibrations (MECE 2430U or ENGR 2020U)	MECE 3220U Machine Design (MECE 3270U, MECE 2310U, MECE 2420U)	MECE 3390U Mechatronics (MECE 3270U, MECE 3350U)	MECE 3930U Heat Transfer (MECE 2320U or ENGR 2010U or MECE 2640U)	MECE 4240U Applied Thermal & Fluids Engineering (MECE 2320U or MECE 2640U, MECE 2860U)
4-1	ENGR 4760U Ethics, Law and Professionalism for Engineers	ENGR 4950U Capstone Systems Design for Mechanical, Automotive, Mechatronics and Manufacturing Engineering I (Successful completion of all non-elective courses in year three)	MANE 4280U Robotics & Automation (ENGR/MECE 3350U)	MECE 4210U Advanced Solid Mechanics and Stress Analysis (MECE 3XXXU)	Engineering Elective	Liberal Studies Elective
4-2	ENGR 4951U Capstone Systems Design for Mechanical, Automotive, Mechatronics and Manufacturing Engineering II (ENGR 4950U)	Engineering Elective	Engineering Elective	Engineering Elective		

Mechanical Engineering: Energy Option 2017-2018

Year	Course	Course	Course	Course	Course	Course
1-1	COMM 1050U Technical Communications	ENGR 1015U Introduction to Engineering	MATH 1010U Calculus I	MATH 1850U Linear Algebra for Engineers (Coreq: MATH 1010U)	PHY 1010U Physics I	
1-2	CHEM 1800U Chemistry for Engineers (Credit restrictions: CHEM 1010U/ CHEM 1020U)	ENGR 1025U Engineering Design (ENGR 1015U)	ENGR 1200U Introduction to Programming for Engineers (Credit Restriction: INFR 1100U)	MATH 1020U Calculus II (MATH 1010U)	PHY 1020U Physics II (PHY 1010U)	SSCI 1470U Impact of Science and Technology on Society
2-1	MANE 2220U Structure and Properties of Materials (CHEM 1800U)	MATH 2860U Differential Equations for Engineers (MATH 1020U, Coreq: MATH 1850U)	MECE 2230U Statics (MATH 1020U,PHY 1010U)	MECE 2310U Concurrent Engineering and Design (ENGR 3200U or ENGR 1025U)	MECE 2320U Thermodynamics (PHY 1010U)	
2-2	ELEE 2790U Electric Circuits (MATH 1020U, MATH 1850U, PHY 1020U)	MATH 2070U Numerical Methods (MATH 1020U, MATH 1850U or MATH 2050U)	MECE 2420U Solid Mechanics I (MECE 2230U)	MECE 2430U Dynamics (MATH 1850U, MECE 2230U)	MECE 2860U Fluid Mechanics (PHY 1010U, MATH 1020U)	STAT 2800U Statistics and Probability for Engineers (MATH 1020U)
3-1	MECE 3XXXU Solid Mechanics II (MECE 2420U)	MANE 3190U Manufacturing and Production Processes (MANE 2220U)	MECE 3030U Computer-Aided Design (MECE 2310U, MECE 2420U)	MECE 3260U Introduction to Energy Systems (MECE 2320U or ENGR 2010U or MECE 2640U, ENVS 1000U or ENGR 1015U)	MECE 3270U Kinematics and Dynamics of Machines (MECE 2430U or ENGR 2020U)	MECE 3350U Control Systems (ELEE 2790U or ENGR/ELEE 2210U, MATH 2860U)
3-2	AUTE 3450U Combustion and Engines (CHEM 1800U, MECE 2320U or MECE 2640U)	ENGR 3360U Engineering Economics	MECE 3220U Machine Design (MECE 3270U, MECE 2310U, MECE 2420U)	MECE 3320U Fluid Power Systems (MECE 2860U, MECE 3350U)	MECE 3930U Heat Transfer (MECE 2320U or ENGR 2010U or MECE 2640U)	MECE 4240U Applied Thermal & Fluids Engineering (MECE 2320U or MECE 2640U, MECE 2860U)
4-1	ENGR 4760U Ethics, Law and Professionalism for Engineers	ENGR 4950U Capstone Systems Design for Mechanical, Automotive, Mechatronics and Manufacturing Engineering I (Successful completion of all non-elective courses in year three)	MANE 4380U Life Cycle Engineering (MECE 3030U)	MECE 4430U Sustainable and Alternative Energy Technologies (MECE 4240U)	MECE 4410U Fossil Fuel Energy Conversion (MECE 3260U)	Liberal Studies Elective
4-2	ENGR 4951U Capstone Systems Design for Mechanical, Automotive, Mechatronics and Manufacturing Engineering II (ENGR 4950U)	MECE 3410U Electro-Mechanical Energy Conversion (ELEE 2790U, MECE 2320U or MECE 2640U)	MECE 4450U Thermal Environmental Engineering (MECE 4240U)	Engineering Elective	Engineering Elective	Liberal Studies Elective

Automotive Engineering 2017-2018

Year	Course	Course	Course	Course	Course	Course
1-1	COMM 1050U Technical Communications	ENGR 1015U Introduction to Engineering	MATH 1010U Calculus I	MATH 1850U Linear Algebra for Engineers (Coreq: MATH 1010U)	PHY 1010U Physics I	
1-2	CHEM 1800U Chemistry for Engineers (Credit restrictions: CHEM 1010U/CHEM 1020U)	ENGR 1025U Engineering Design (ENGR 1015U)	ENGR 1200U Introduction to Programming for Engineers (Credit Restriction: INFR 1100U)	MATH 1020U Calculus II (MATH 1010U)	PHY 1020U Physics II (PHY 1010U)	SSCI 1470U Impact of Science and Technology on Society
2-1	MANE 2220U Structure and Properties of Materials (CHEM 1800U)	MATH 2860U Differential Equations for Engineers (MATH 1020U, Coreq: MATH 1850U)	MECE 2230U Statics (MATH 1020U, PHY 1010U)	MECE 2310U Concurrent Engineering and Design (ENGR 3200U or ENGR 1025U)	MECE 2640U Thermodynamics and Heat Transfer (MATH 1020U, PHY 1010U)	Liberal Studies Elective
2-2	ELEE 2790U Electric Circuits (MATH 1020U, MATH 1850U, PHY 1020U)	MATH 2070U Numerical Methods (MATH 1020U, MATH 1850U or MATH 2050U)	MECE 2420U Solid Mechanics I (MECE 2230U)	MECE 2430U Dynamics (MATH 1850U, MECE 2230U)	MECE 2860U Fluid Mechanics (PHY 1010U, MATH 1020U)	STAT 2800U Statistics and Probability for Engineers (MATH 1020U)
3-1	AUTE 3010U Introduction to Automotive Engineering (MECE 2230U)	MECE 3XXXU Solid Mechanics II (MECE 2420U)	MANE 3190U Manufacturing and Production Processes (MANE 2220U)	MECE 3030U Computer Aided-Design (MECE 2310U, MECE 2420U)	MECE 3270U Kinematics and Dynamics of Machines (MECE 2430U or ENGR 2020U)	MECE 3350U Control Systems (ELEE 2790U or ENGR/ELEE 2210U, MATH 2860U)
3-2	AUTE 3290U Powertrain Design (AUTE 3010U, MECE 3270U)	AUTE 3450U Combustion and Engines (CHEM 1800U, MECE 2320U or MECE 2640U)	ENGR 3360U Engineering Economics	MECE 3210U Mechanical Vibrations (MECE 2430U or ENGR 2020U)	MECE 3220U Machine Design (MECE 3270U, MECE 2310U, MECE 2420U)	MECE 3390U Mechatronics (MECE 3270U, MECE 3350U)
4-1	AUTE 4010U Vehicle Dynamics and Control (MECE 3210U, ENGR 4260U or AUTE 3010U)	AUTE 4060U Automotive Structural Design (AUTE 3010U or ENGR 4260U, MECE 3220U)	AUTE 4070U Chassis Systems Design (AUTE 3010U or ENGR 4260U, MECE 3270U)	ENGR 4950U Capstone Systems Design for Mechanical, Automotive, Mechatronics and Manufacturing Engineering I (Successful completion of all non-elective courses in year three)	MECE 4210U Advanced Solid Mechanics and Stress Analysis (MECE 3XXXU)	Engineering Elective
4-2	ENGR 4760U Ethics, Law and Professionalism for Engineers	ENGR 4951U Capstone Systems Design for Mechanical, Automotive, Mechatronics and Manufacturing Engineering II (ENGR 4950U)	MANE 4045U Quality Control (STAT 2800U)	Engineering Elective	Engineering Elective	Liberal Studies Elective

COURSE CHANGE TEMPLATE

Faculty: Faculty of Engineering and Applied Science
Program: Mechanical Engineering, Mechanical Engineering – Energy Specialization, Automotive Engineering and their corresponding Management programs for change to elective status. Content change to course description and major topics effective to above programs as well as Manufacturing Engineering.

Subject Code and Course Number: MANE 3120U	Current Full Course Title: Thermo-mechanical Processing of Materials
X Core ☐ **Elective** <mark>**Change to Elective Course for Mechanical, Mechanical-Energy, and Automotive Engineering**</mark>	**Current Short-Form Course Title (max. 30 characters):** Thermo-mech Process of Materials

COURSE CHANGES (check all that apply)

☐	Course title	☐	Credit weighting
X	Course description	☐	Contact hours
☐	Course number	☐	Prerequisites
☐	Subject code	☐	Co-requisites
☐	Grade Mode (N – alpha grade, P – Pass/Fail)	☐	Cross-listings
☐	Learning outcomes	☐	Credit restrictions
☐	Course Instructional Method (CLS, HYB, WB1, WEB)	☐	Equivalency Courses
☐	Delete course from Academic Calendar	☐	Delete course from Program only (attach this form to program modification)
☐	Supplementary Fees	☐	Teaching and assessment methods
X	Other (please specify) - change from core to elective course for Mechanical, Mechanical-Energy, and Automotive Engineering - Major Topics	☐	Term Change

DESCRIPTION AND/OR REASON FOR CHANGE AND WAYS IN WHICH IT MAINTAINS/ENHANCES COURSE/PROGRAM OBJECTIVES

These changes are being recommended after a thorough review of the stream, based on comments made by students and course instructors. Progression of content coverage in related courses in this stream have been modified to enable a steady progression in learning outcomes. Removal of this course will allow space in the program map for an intermediate Solid Mechanics course in the stream. This course should be added to the list of Engineering Electives offered to Mechanical Engineering, Mechanical Engineering – Energy Specialization, and Automotive Engineering students.

CHANGE TO CALENDAR DESCRIPTION (if required)

Current	Proposed
Fundamentals of mechanical behavior of materials, phase diagrams, microstructure and properties of alloys, material selection process, thermal processing and heat treatment leading to	Time-temperature-transformation diagrams, strengthening mechanisms, treatment of materials, thermal processing and heat treatment, such as annealing and tempering,

alternation of physical properties, yield behavior, cold and hot working processes, failure modes, surface structure and properties, fatigue and fractures, surface texture and roughness, friction, wear, and basic lubrication.	stress concentrations, properties of alloys, polymers and composites, material selection rationale, fracture and ductile modes, fatigue mechanisms, creep, and case studies of engineering material failures.

CHANGE TO CONTACT HOURS (if applicable, indicate changes to total contact hours; changes to frequency (e.g. 1x3 hours to 2X1.5 hours) not required):

Lecture	Lab
Tutorial	Other

OTHER CHANGES (if applicable)

Prerequisites	
Co-requisites	
Credit restrictions	
Grading scheme	☐ letter grade ☐ pass/fail
Major Topics	~~Fundamentals of mechanical behavior of materials~~ - Phase diagrams <mark>and strengthening mechanisms review</mark>~~, microstructure and properties of alloys~~ ~~Material selection process~~ - Thermal processing and heat treatment ~~leading to alternation of Physical properties, yield behavior, cold and hot working processes~~ <mark>High temperature deformation of metals</mark> <mark>Processing fundamentals of polymers and composites</mark> <mark>Stress concentrations</mark> <mark>Fracture mechanics and fracture toughness</mark> <mark>Fatigue mechanisms and fracture from cyclic loading</mark> <mark>Creep failure and deformation</mark> <mark>Analysis of engineering failures</mark> ~~Failure modes, fatigue and fractures~~ ~~Surface structure, roughness and properties,~~ ~~Friction, wear, and basic lubrication~~

CHANGES TO LEARNING OUTCOMES (if applicable)

CONSULTATION AND FINANCIAL IMPLICATIONS, WHERE APPROPRIATE

EFFECTIVE SEMESTER (Specify First Active Term e.g. Fall 2017)

Fall 2018

APPROVAL DATES

Program Curriculum Committee approval	Mechanical Engineering (including Energy Specialization) – November 15, 2017 Automotive Engineering – November 15, 2017 Manufacturing Engineering – November 15, 2017

Department Council approval	November 20, 2017
Engineering Curriculum Committee approval	November 22, 2017
Engineering Faculty Council approval	December 6, 2017
CPRC Approval	19 January 2018

COURSE CHANGE TEMPLATE

Faculty: Faculty of Engineering and Applied Science
Program: Mechanical Engineering (core), Automotive Engineering (core), Mechatronics Engineering (elective), and their corresponding Management programs

Subject Code and Course Number: MECE 4210U	**Current Full Course Title:** Advanced Solid Mechanics and Stress Analysis
X Core X Elective	**Current Short-Form Course Title (max. 30 characters):** Adv Solid Mech & Stress Analysis

COURSE CHANGES (check all that apply)

☐	Course title	☐	Credit weighting
X	Course description	X	Contact hours
☐	Course number	X	Prerequisites
☐	Subject code	☐	Co-requisites
☐	Grade Mode (N – alpha grade, P – Pass/Fail)	☐	Cross-listings
☐	Learning outcomes	☐	Credit restrictions
☐	Course Instructional Method (CLS, HYB, WB1, WEB)	☐	Equivalency Courses
☐	Delete course from Academic Calendar	☐	Delete course from Program only (attach this form to program modification)
☐	Supplementary Fees	☐	Teaching and assessment methods

X	Other (please specify)
	  - Major Topics
	  - Remove as elective option for Mechatronics Engineering program
		☐	Term Change

DESCRIPTION AND/OR REASON FOR CHANGE AND WAYS IN WHICH IT MAINTAINS/ENHANCES COURSE/PROGRAM OBJECTIVES

These changes are being recommended after a thorough review of the solid mechanics stream, based on comments made by students and course instructors. Progression of content coverage in related courses in this stream have been modified to enable a steady progression in learning outcomes.

CHANGE TO CALENDAR DESCRIPTION (if required)

Current	Proposed
MECE 4210U – Advanced Solid Mechanics and Stress Analysis Three-dimensional stress analysis; strain energy; energy methods; finite element method; asymmetric and curved beams, superposition of beam solutions, beams on elastic foundations; plate bending; buckling, including Euler's formulae for buckling; eccentric loading; fracture mechanics; fatigue. **Credit hours: 3** **Lecture hours: 4** **Laboratory hours: 2 (bi-weekly)**	**MECE 4210U – Advanced Solid Mechanics and Stress Analysis** Three-dimensional stress and strain analysis; strain energy methods for deflection; asymmetric and curved beams; bending, torsion and shear centers; beams on elastic foundations; thick cylinders; buckling and elastic stability; flat plates.. **Credit hours: 3** **Lecture hours: 3** **Laboratory hours: 2 (bi-weekly)** **Tutorial hours: 1**

Tutorial hours: 1 Prerequisite(s): MECE 3220U	Prerequisite(s): ==MECE 3420U== (Solid Mechanics II)

CHANGE TO CONTACT HOURS (if applicable, indicate changes to total contact hours; changes to frequency (e.g. 1x3 hours to 2X1.5 hours) not required):

==Lecture: reduce from 4 hours to 3 hours==	Lab
Tutorial	Other

OTHER CHANGES (if applicable)

Prerequisites	
Co-requisites	
Credit restrictions	
Grading scheme	☐ **letter grade** ☐ **pass/fail**
Major Topics	Elasticity Theory, 3D Stress and Strain Linear Stress-Strain-Temperature Relationships Inelastic Material Behaviour and Failure Envelopes Energy Methods for Deflection Torsion (in complex shapes) Bending of Straight and Non-Symmetrical Beams Shear Center in Thin Wall Beams Curved Beams Beams on Elastic Foundations Thick Walled Cylinders Columns and Elastic Instability Flat Plates

CHANGES TO LEARNING OUTCOMES (if applicable)

CONSULTATION AND FINANCIAL IMPLICATIONS, WHERE APPROPRIATE

EFFECTIVE SEMESTER (Specify First Active Term e.g. Fall 2017)

Fall 2019

APPROVAL DATES

Program Curriculum Committee approval	Mechanical Engineering (including Energy Specialization) – November 15, 2017 Automotive Engineering – November 15, 2017 Mechatronics Engineering – November 15, 2017
Department Council approval	November 20, 2017
Engineering Curriculum Committee approval	November 22, 2017
Engineering Faculty Council approval	December 6, 2017
CPRC Approval	19 January 2018

NEW COURSE TEMPLATE

Faculty: Engineering and Applied Science		
Course title: Solid Mechanics II		
Course number: MECE 3420U	Cross-listings:	__X_ Core ____ Elective
Credit weight: 3	Contact hours: 3__ Lecture _____ Lab ___1__ Tutorial _____ Other	

CALENDAR DESCRIPTION

This course provides a progressive step in the engineering knowledge of solid mechanics. The topics include a review of stress and strain transformation, application of different failure analysis criteria, analysis of beams and shafts and computing deflections, statically indeterminate beams and shafts, buckling of columns, deflection assessment of beams under various types of loading using virtual work theorem and Castigliano's method.

Prerequisites	MECE 2420U – Solid Mechanics I
Co-requisites	
Credit restrictions	
Credit exemptions	
Grading scheme	X letter grade ☐ pass/fail

LEARNING OUTCOMES

As 100% Engineering Science, the outcomes are an expanded engineering knowledge base and skill set for problem analysis in the solid mechanics field. This course is designed to prepare students for the fundamentals of machine design. Upon completing this course, the students will have learnt the essentials to conduct the following analyses:

- Stress and strain transformation review
- Familiarization with failure criteria (Tresca, max shear, von-Mises)
- Analysis of beam and shafts
- Deflection of beams and shafts, elastic curves
- Statically indeterminate beams and shafts
- Buckling of columns
- Virtual work and application of Castigliano's theorem

DELIVERY MODE

(check all that may apply)   X face-to-face   ☐ hybrid   ☐ online

TEACHING AND ASSESSMENT METHODS

Assignments – Midterm Exams – Final Exam

CONSULTATION AND FINANCIAL IMPLICATIONS, WHERE APPROPRIATE

1 Course Load addition in the AMME Department

APPROVAL DATES

Program Curriculum Committee approval	Automotive Engineering – November 15, 2017 Mechanical Engineering (including Energy Specialization) – November 15, 2017
Department Council approval	November 20, 2017
Engineering Curriculum Committee approval	November 22, 2017
Engineering Faculty Council approval	December 6, 2017
CPRC Approval	19 January 2018