COURSE OUTLINE: MCH605 - MECHANICAL LAB II

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Course Code: Title	MCH605: MECHANICAL LAB II
Program Number: Name	4043: MECH ENG. TECHNOLOGY
Department:	MECHANICAL TECHNIQUES PS
Academic Year:	2024-2025
Course Description:	The Mechanical Lab II course supplements and supports the Advanced Strength of Materials, Advanced Dynamics of Machines, Machine Design, and Applied Thermodynamics & Heat Transfer courses with practical learning. Lab topics in Advanced Strength of Materials include stresses in beams, deflection in beams, and columns. Lab topics in the Advanced Dynamics of Machines include forces in machines and balancing rotating/reciprocating masses. Lab topics in Machine Design include connections, material strength, and power transmission. Lab topics in Applied Thermodynamics include heat transfer and psychrometry.
Total Credits:	3
Hours/Week:	3
Total Hours:	42
Prerequisites:	There are no pre-requisites for this course.
Corequisites:	There are no co-requisites for this course.
Vocational Learning Outcomes (VLO's) addressed in this course: **Please refer to program web page for a complete listing of program outcomes where applicable.**	**4043 - MECH ENG. TECHNOLOGY** VLO 1 Monitor compliance with current legislation, standards, regulations and guidelines. VLO 2 Plan, co-ordinate, implement and evaluate quality control and quality assurance procedures to meet organizational standards and requirements. VLO 3 Monitor and encourage compliance with current health and safety legislation, as well as organizational practices and procedures. VLO 4 Develop and apply sustainability best practices in workplaces. VLO 5 Use current and emerging technologies to implement mechanical engineering projects. VLO 6 Analyze and solve complex mechanical problems by applying mathematics and fundamentals of mechanical engineering. VLO 7 Prepare, analyze, evaluate and modify mechanical engineering drawings and other related technical documents. VLO 8 Design and analyze mechanical components, processes and systems by applying fundamentals of mechanical engineering. VLO 9 Design, manufacture and maintain mechanical components according to required specifications. VLO 10 Establish and verify the specifications of materials, processes and operations for the design and production of mechanical components. VLO 11 Plan, implement and evaluate projects by applying project management principles.

	VLO 12	Develop strategies for ongoing personal and professional development to enhance work performance.
Essential Employability Skills (EES) addressed in this course:	EES 1	Communicate clearly, concisely and correctly in the written, spoken, and visual form that fulfills the purpose and meets the needs of the audience.
	EES 2	Respond to written, spoken, or visual messages in a manner that ensures effective communication.
	EES 3	Execute mathematical operations accurately.
	EES 4	Apply a systematic approach to solve problems.
	EES 5	Use a variety of thinking skills to anticipate and solve problems.
	EES 6	Locate, select, organize, and document information using appropriate technology and information systems.
	EES 7	Analyze, evaluate, and apply relevant information from a variety of sources.
	EES 8	Show respect for the diverse opinions, values, belief systems, and contributions of others.
	EES 9	Interact with others in groups or teams that contribute to effective working relationships and the achievement of goals.
	EES 10	Manage the use of time and other resources to complete projects.
	EES 11	Take responsibility for ones own actions, decisions, and consequences.
Course Evaluation:	Passing Grade: 50%, A minimum program GPA of 2.0 or higher where program specific standards exist is required for graduation.	
Other Course Evaluation & Assessment Requirements:	Grade Definition Grade Point Equivalent A+ 90 - 100% 4.00 A 80 - 89% B 70 - 79% 3.00 C 60 - 69% 2.00 D 50 - 59% 1.00 F (Fail) 49% and below 0.00 CR (Credit) Credit for diploma requirements has been awarded. S Satisfactory achievement in field /clinical placement or non-graded subject area. U Unsatisfactory achievement in field/clinical placement or non-graded subject area. X A temporary grade limited to situations with extenuating circumstances giving a student additional time to complete the requirements for a course. NR Grade not reported to Registrar`s office. W Student has withdrawn from the course without academic penalty.	
Books and Required Resources:	AutoCad Mechanical by Autodesk Pipe-Flo by Revalize Software	
Course Outcomes and	**Course Outcome 1**	**Learning Objectives for Course Outcome 1**

Learning Objectives:

1. Solve deflection and stresses in beams for various loading conditions.	1.1 Utilize CAD software to simulate the effects of externally applied forces to beams, columns and complex structures. 1.2 Design and select bolted and welded connections for various loading conditions.
Course Outcome 2	**Learning Objectives for Course Outcome 2**
2. Analyze forces in machines and mechanical systems.	2.1 Apply advanced potential and kinetic energy analysis procedures to evaluate the performance of belts and pulleys. 2.2 Develop Hooke`s law and apply basic rules of spring design.
Course Outcome 3	**Learning Objectives for Course Outcome 3**
3. Evaluate rotating and reciprocating masses.	3.1 Balance a rotating mass statically and dynamically. 3.2 Demonstrate phenomena of whirling shafts. 3.3 Design and select bearing systems for rotating shafts.
Course Outcome 4	**Learning Objectives for Course Outcome 4**
4. Design components for power transmission applications.	4.1 Design components (eg. gears, shafts, pulleys) used to convert energy into linear and angular motion. 4.2 Study the dynamic behaviour of cams and followers. 4.3 Apply velocity ratios and efficiency equations for the design of geared systems.
Course Outcome 5	**Learning Objectives for Course Outcome 5**
5. Develop a thermodynamic power cycle for an internal combustion engine.	5.1 Explore the relationship between pressure and volume of an ideal gas at a fixed temperature. 5.2 Investigate thermodynamic principles of energy conversion and mechanical power measurement in an engine.
Course Outcome 6	**Learning Objectives for Course Outcome 6**
6. Apply heat transfer principles to calculate and verify performance of heating/cooling systems and heat exchangers.	6.1 Utilize psychrometry charts to calculate overall heat loss/gain in buildings. 6.2 Investigate the parameters affecting conduction and convection heat transfer through solid materials and pipes. 6.3 Verify the principles and performance of heat exchangers.

Evaluation Process and Grading System:

Evaluation Type	Evaluation Weight
Lab Reports (6)	100%

Date: November 12, 2024

Addendum: Please refer to the course outline addendum on the Learning Management System for further information.