



COURSE OUTLINE: MCH254 - PREVENTIVE MAINT.

Prepared: Cam Pucci

Approved: Corey Meunier, Chair, Technology and Skilled Trades

Course Code: Title	MCH254: PREVENTIVE/PREDICTIVE MAINTENANCE
Program Number: Name	4039: MECH. ENG. TN-MANUFA
Department:	MECHANICAL TECHNIQUES PS
Semesters/Terms:	19W
Course Description:	The student will learn about the various procedures and equipment used as well as processes associated with a preventive /predictive maintenance program. Other forms of maintenance programs currently being used will also be examined. Topics include the various approaches to maintenance, vibration and analysis, fluid analysis and filtering. The student will design and carry out actual maintenance programs on various mechanical equipment using practical labs and a hands on approach.
Total Credits:	2
Hours/Week:	2
Total Hours:	0
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.	4039 - MECH. ENG. TN-MANUFA VLO 1 Complete all work in compliance with current legislation, standards, regulations and guidelines. VLO 3 Comply with current health and safety legislation, as well as organizational practices and procedures. VLO 5 Use current and emerging technologies to support the implementation of mechanical engineering projects. VLO 8 Contribute to the design and the analysis of mechanical components, processes and systems applying fundamentals of mechanical engineering. VLO 9 Manufacture, assemble, maintain and repair mechanical components according to required specifications. VLO 11 Contribute to the planning, implementation and evaluation of projects.
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 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 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.



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Course Evaluation:	Passing Grade: 50%, D												
Other Course Evaluation & Assessment Requirements:	<p>Assignments, Lab work, Attendance</p> <p>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</p> <p>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.</p>												
Books and Required Resources:	<p>Millwright Manual by Province of British Columbia ISBN: 0771894732 Hand outs</p>												
Course Outcomes and Learning Objectives:	<table> <tr> <th>Course Outcome 1</th><th>Learning Objectives for Course Outcome 1</th></tr> <tr> <td>1. Understand and explain Breakdown Maintenance</td><td> 1.1 Discuss the history of breakdown maintenance 1.2 Explain the disadvantages of breakdown maintenance 1.3 Understand catastrophic failures and their consequences to production 1.4 Understand the cost associated with breakdown maintenance 1.5 Explain why breakdown maintenance is used </td></tr> <tr> <th>Course Outcome 2</th><th>Learning Objectives for Course Outcome 2</th></tr> <tr> <td>2. Understand and explain Preventative Maintenance</td><td> 2.1 Discuss the history of preventative maintenance 2.2 Explain the advantages of preventative maintenance 2.3 Discuss cost savings to production using preventative maintenance 2.4 Understand the importance of proper planning 2.5 Understand problems associated with Preventative Maintenance 2.6 Understand the importance of using equipment files and record keeping 2.7 Understand the importance of training workers to use preventative maintenance practices properly 2.8 Understanding the importance of having trained skilled trades people 2.9 Design a preventative maintenance work order and carry it out using various equipment and technical tools </td></tr> <tr> <th>Course Outcome 3</th><th>Learning Objectives for Course Outcome 3</th></tr> <tr> <td>3. Understand and explain</td><td>3.1 Discuss the history of Predictive Maintenance</td></tr> </table>	Course Outcome 1	Learning Objectives for Course Outcome 1	1. Understand and explain Breakdown Maintenance	1.1 Discuss the history of breakdown maintenance 1.2 Explain the disadvantages of breakdown maintenance 1.3 Understand catastrophic failures and their consequences to production 1.4 Understand the cost associated with breakdown maintenance 1.5 Explain why breakdown maintenance is used	Course Outcome 2	Learning Objectives for Course Outcome 2	2. Understand and explain Preventative Maintenance	2.1 Discuss the history of preventative maintenance 2.2 Explain the advantages of preventative maintenance 2.3 Discuss cost savings to production using preventative maintenance 2.4 Understand the importance of proper planning 2.5 Understand problems associated with Preventative Maintenance 2.6 Understand the importance of using equipment files and record keeping 2.7 Understand the importance of training workers to use preventative maintenance practices properly 2.8 Understanding the importance of having trained skilled trades people 2.9 Design a preventative maintenance work order and carry it out using various equipment and technical tools	Course Outcome 3	Learning Objectives for Course Outcome 3	3. Understand and explain	3.1 Discuss the history of Predictive Maintenance
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3. Understand and explain	3.1 Discuss the history of Predictive Maintenance												



	Predictive Maintenance	3.2 Discuss the advantages of Predictive Maintenance 3.3 Explain and understand what $\hat{A}f\hat{A}\phi\hat{A}\sim\hat{A}\dots$ prediction $\hat{A}f\hat{A}\phi\hat{A}\phi\hat{A}\sim\hat{A}\hat{A}\hat{A}\square$ means in maintenance 3.4 Explain the process of designing a Predictive Maintenance system 3.5 Design a Predictive Maintenance work order and carry it out on equipment using various technical tools						
	Course Outcome 4	Learning Objectives for Course Outcome 4						
	4. Understand and explain Proactive Maintenance	4.1 Discuss the make up of a good Proactive Maintenance System 4.2 Discuss various equipment used in Proactive Maintenance 4.3 Discuss monitoring techniques used by production and maintenance 4.4 Discuss root causes of failures in machinery 4.5 Carry out assignments to enforce this learning						
	Course Outcome 5	Learning Objectives for Course Outcome 5						
	5. Explain and understand other maintenance systems	5.1 Discuss total productive maintenance 5.2 Discuss preventive engineering 5.3 Discuss reliability engineering 5.4 Discuss productive maintenance						
	Course Outcome 6	Learning Objectives for Course Outcome 6						
	6. Discuss Vibration Analysis and Balancing and perform labs	6.1 Discuss and understand vibration in machinery 6.2 Explain terminology terms used 6.3 Discuss the cause of vibration 6.4 Discuss the tools used to determine excessive vibration 6.5 Discuss control methods of vibration and equipment used 6.6 Discuss the problems associated with excessive vibration 6.7 Discuss balancing procedures 6.8 Perform vibration lab						
	Course Outcome 7	Learning Objectives for Course Outcome 7						
	7. Discuss various types of inspections used on components. Perform inspections on equipment.	7.1 Discuss visual inspections 7.2 Discuss types of dyes used and precautions 7.3 Discuss Magnetic Particle Inspection 7.4 Discuss Current inspection 7.5 Discuss Ultrasonic Inspection 7.5 Discuss Radiographic Inspection 7.6 Discuss contamination control 7.7 Discuss Particle Analysis 7.8 Perform NDT labs as assigned						
	Course Outcome 8	Learning Objectives for Course Outcome 8						
	8. Explain and understand Laser Alignment Equipment	8.1 Explain the use of laser alignment equipment 8.2 Discuss the advantages of using modern alignment techniques 8.3 Discuss the problems associated with Alignment procedures 8.4 Perform Alignment Labs on equipment						
Evaluation Process and Grading System:		<table> <tr> <th>Evaluation Type</th><th>Evaluation Weight</th><th>Course Outcome Assessed</th></tr> <tr> <td> </td><td> </td><td> </td></tr> </table>	Evaluation Type	Evaluation Weight	Course Outcome Assessed			
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	Activities and Assignments	40%	
	Attendance/Attitude	10%	
	Final Exam or Final Assignment	10%	
	Tests	40%	

Date: August 28, 2018

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