A POLYTECHNIC INSTITUTION

Course Outline

School of Manufacturing, Electronics and Industrial Processes
Program: Mechanical Engineering Technologies
Option: Part-Time Studies

MSYS 3179
Hydronic Heating Systems

Start Date:	January, 2006			**End Date:**	April, 2006		
Total Hours:	42	**Total Weeks:**	14	**Term/Level:**		**Course Credits:**	3.5
Hours/Week:	3	**Lecture:**	3 **Lab:**	**Shop:**		**Seminar:**	**Other:**

Prerequisites		**MSYS 3179 is a Prerequisite for:**	
Course No.	**Course Name**	**Course No.**	**Course Name**
MSYS 2079	HVAC Loads	None	

Course Description

Covers theory and applications for hydronic heating systems design and components, boilers, controls, venting, combustion and ventilation air, building zoning, and fuels cost estimating. The above is applied to a design for a preselected building.

Detailed Course Description

To examine design principles and practices relating to commercial hydronic heating systems.

Evaluation

Subject to Adjustment	
	40%
Final Examination	40%
Midterm Examination	20%
Assignment	
TOTAL	100%

Comments: Students must demonstrate overall competency in the Course Learning Outcomes/Competencies section of this outline for credit to be earned for this course. To pass this course a mark of 50% must be achieved.

■ Course Learning Outcomes/Competencies

Upon successful completion, the student will be able to:

1. differentiate among the main types of hydronic heating systems.
2. calculate the required combustion air and fuel based on combustion equations.
3. design venting systems for gas-fired appliances based on BC Gas Code Specifications.
4. select and specify suitable pipe, fittings, and valves for heating systems.
5. select various terminal heating units and radiant panels based on heat requirement calculations.
6. identify criteria for zoning systems.
7. design a hydronic heating system based on necessary engineering calculations.
8. lay out a hydronic heating system to industry standards.
9. analyze various types of boilers and make selections.
10. read simple control diagrams.
11. describe various steam heating systems and components.

■ Verification

I verify that the content of this course outline is current.

Douglas Hedwood — Authoring Instructor

Jan 09/06 — Date

I verify that this course outline has been reviewed.

Carl La Bounty — Program Head/Chief Instructor

Jan 09/06 — Date

I verify that this course outline complies with BCIT policy.

Dean/Associate Dean

2006/01/09 — Date

Note: Should changes be required to the content of this course outline, students will be given reasonable notice.

■ Instructor(s)

E.H. LaBounty

Office Location: SW9–201L
Office Hrs.: As posted

Office Phone: 604-451-6827
E-mail Address: Earl_LaBounty@bcit.ca

■ Learning Resources

Required:

Available at BCIT Bookstore:

- Engineering pad
- 1 ½" three-ring binder
- "Hydronic Heating Systems" manual by E.H. LaBounty
- five sheets of a three-size drawing paper
- one, clear cover duo-tang folder.

■ Information for Students

See Policy Information for Mechanical Technology Students and the current issue of the British Columbia Institute of Technology Full-Time Calendar — General Information.

■ Assignment Details

See Policy Information for Mechanical Technology Students.

Schedule

Week	Lecture or Lab	Material Covered	Date
1	Lectures 1 & 2	A. Course outline B. Introduction to hydronic heating systems C. Main types of hydronic heating systems D. Hydronic heating piping circuits	
2	Lectures 3 & 4	A. Pipe and fittings for hydronic heating systems B. Pipe support systems C. Control of pipe movement D. Introduction to assignment	
3	Lectures 5 & 6	A. Terminal hydronic heating units B. Selection of terminal hydronic heat units C. Lay out heating units on main floor plan	
4	Lectures 7, 8, & 9	A. Valves for hydronic heating systems B. Specialties for hydronic heat systems C. Zoning for mechanical systems in buildings D. Zone assignment	
5	Lectures 10 & 11	A. Radiant panel heating systems B. Radiant floor panel design	
6	Lecture 12	A. **Midterm examination** B. Hydronic heating systems graphics C. Crawlspace plan	
7	Lectures 13 & 14	A. Hydronic boilers, trim, and controls B. Selection of boilers C. Typical equipment and mechanical room piping arrangements D. Crawlspace plan	
8	Lecture 15	A. Hydronic heating systems pipe sizing B. Hydronic heating systems circulating pumps selection C. Crawlspace plan	
9	Lectures 16 & 17	A. Steam heating systems B. Compression tanks C. Mechanical room plan	
10	Lectures 18 & 19	A. Properties of fuel gases and gas piping design B. Combustion and ventilation air requirements for gas-fired equipment C. Mechanical room plan	

WEEK	LECTURE OR LAB	MATERIAL COVERED	DATE
10	LECTURES 18 & 19	A. PROPERTIES OF FUEL GASES AND GAS PIPING DESIGN B. COMBUSTION AND VENTILATION AIR REQUIREMENTS FOR GAS-FIRED EQUIPMENT C. MECHANICAL ROOM PLAN	
11	LECTURES 20, 21 & 22	A. PRODUCTS OF COMBUSTION REMOVAL B. PROBLEMS IN PRODUCTS OF COMBUSTION REMOVAL FROM GAS-FIRED APPLIANCES C. FUEL AND ENERGY COSTS ESTIMATING D. MECHANICAL ROOM PLAN	
12	LECTURE 23	A. CONTROL OF SYSTEMS B. CONTROL SYSTEMS ASSIGNMENT SCHEMATIC	
13		A. REVIEW	
14		A. **FINAL EXAM** B. ASSIGNMENT DUE	

BRITISH COLUMBIA INSTITUTE OF TECHNOLOGY

Operating Unit: Manufacturing and Industrial Mechanical
Program: Mechanical Engineering Technologies
Option: Part Time Studies

WEEK	LECTURE OR LAB	MATERIAL COVERED	DATE
1	LECTURES 1 & 2	A. COURSE OUTLINE B. INTRODUCTION TO HYDRONIC HEATING SYSTEMS C. MAIN TYPES OF HYDRONIC HEATING SYSTEMS D. HYDRONIC HEATING PIPING CIRCUITS	
2	LECTURES 3 & 4	A. PIPE AND FITTINGS FOR HYDRONIC HEATING SYSTEMS B. PIPE SUPPORT SYSTEMS C. CONTROL OF PIPE MOVEMENT D. INTRODUCTION TO ASSIGNMENT	
3	LECTURES 5 & 6	A. TERMINAL HYDRONIC HEATING UNITS B. SELECTION OF TERMINAL HYDRONIC HEAT UNITS C. LAY OUT HEATING UNITS ON MAIN FLOOR PLAN	
4	LECTURES 7, 8 & 9	A. VALVES FOR HYDRONIC HEATING SYSTEMS B. SPECIALTIES FOR HYDRONIC HEAT SYSTEMS C. ZONING FOR MECHANICAL SYSTEMS IN BUILDINGS D. ZONE ASSIGNMENT	
5	LECTURES 10 & 11	A. RADIANT PANEL HEATING SYSTEMS B. RADIANT FLOOR PANEL DESIGN	
6	LECTURE 12	**A. MIDTERM EXAMINATION** B. HYDRONIC HEATING SYSTEMS GRAPHICS C. CRAWL SPACE PLAN	
7	LECTURES 13 & 14	A. HYDRONIC BOILERS, TRIM AND CONTROLS B. SELECTION OF BOILERS C. TYPICAL EQUIPMENT AND MECHANICAL ROOM PIPING ARRANGEMENTS D. CRAWL SPACE PLAN	
8	LECTURE 15	A. HYDRONIC HEATING SYSTEMS PIPE SIZING B. HYDRONIC HEATING SYSTEMS CIRCULATING PUMPS SELECTION C. CRAWL SPACE PLAN	
9	LECTURES 16 & 17	A. STEAM HEATING SYSTEMS B. COMPRESSION TANKS C. MECHANICAL ROOM PLAN	