SPRINGFIELD TECHNICAL COMMUNITY COLLEGE

ACADEMIC AFFAIRS

Course Number: ENGY 425 Department: Energy Systems Technology

Course Title: Building Management Systems Semester: Spring Year: 1999

Objectives/Competencies

Course Objective	Competencies
1. Communicate in industry language about system components and software involved in system operation.	1. Relate to the specific terms and conditions within the controls industry. 2. Recognize in industry language the basic acronyms used. 3. Recall definitial terminology of control theory.
2. Understand and explain system software capabilities and/or limitations.	1. Identify DDC control potential by relating it to control theory. 2. Illustrate systems capabilities using a building environment. 3. Describe how supervisor computers may be used for self diagnostic functions.
3. Describe future potential.	1. Identify the evolution of electronic controls. 2. Identify the evolution of DDC controls. 3. Relate how system intelligence has grown in building systems.
4. Define direct digital control.	

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	1. Relate microprocessor theory to DDC control systems. 2. Compare conventional control with DDC control systems. 3. Explain the three step process of a DDC controller.
5. Describe control system fundamentals.	1. Explain open and closed loop control systems. 2. Identify the role of feedback in control system design. 3. Relate communication to control fundamentals.
6. Define six automatic control actions.	1. Describe two positions and floating control. 2. Describe proportional control. 3. Describe both integral and derivative functions to control actions.
7. Define control system energy sources.	1. Recognize pneumatic air pressure. 2. Identify fluidic systems. 3. Describe electric and self powered systems.
8. Describe control system elements.	1. Identify sensors in a closed loop control system. 2. Identify transmitters and transducers. 3. Understand characteristics of sensor transmitters and sensor controllers. 4. Describe humidity, pressures and fluid flow sensors.
9. Identify special purpose sensors.	1. Recognition of power measurement device. 2. Identify life/safety devices. 3. Describe carbon monoxide and carbon dioxide sensors.

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10. Define control systems control devices.	1. Relate control valves to DDC control. 2. Identify control valve operators. 3. Relate control dampers to DDC control. 4. Describe damper actuators. 5. Define both parallel and opposed blade damper designs.
11. Describe fundamentals of computer based controls.	1. Relate the terms hardware and software for computers and DDC controls. 2. Identify methods of communications to and from computers and controls. 3. Illustrate basic layout of communication bus functions.
12. Describe organization of computer based control systems.	1. Illustrate system architecture. 2. Define microprocessor architecture. 3. Describe microcomputer architecture.
13. Define direct digital system hardware.	1. Describe analog input points. 2. Describe digital input points. 3. Describe analog output ponts. 4. Describe digital output points.
14. Identify man-machine interface functions.	1. Describe creating and acknowledging alarms. 2. Describe monitors and maintaining point data. 3. Define modification and overriding commands.
15. Explain how digital controllers are interfaced with conventional controllers.	1. Describe the signal conditioning process.

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	2. Describe data conversion process. 3. Define the concepts of pulled width modulation.
16. Describe the fundamentals of direct digital control application strategies.	1. Illustrate minimum outside air (ventilation) control. 2. Illustrate mixed air control. 3. Illustrate static pressure control. 4. Illustrate discharge air control.
17. Describe the fundamentals of variable air volume control routines.	1. Define the use of discharge dampers for VAV applications. 2. Define the use of inlet guide vane control for VAV application. 3. Define the use of variable frequency drives for VAV applications.
18. Describe the use of unique control loop strategies for DDC control.	1. Identify humidification control. 2. Define reset control as it pertains to warm or cool air. 3. Describe PID loop control.
19. Define monitoring strategies for building management.	1. Describe power consumption metering. 2. Describe maintenance time reminders. 3. Describe trend logs. 4. Describe operation reports.
20. Describe energy management supervisors control strategies.	1. Relate optimum start/stop to DDC control. 2. Relate duty cycle control to DDC systems. 3. Describe load shedding.

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21. Define single zone air handler control.	4. Describe basic optimization control routines. 1. Program basic points of a control loop. 2. Prepare basic paperwork and forms for programming systems.
22. Describe the guidelines of designing DDC control systems.	3. Monitor various points in a building. 1. List control system design considerations. 2. Evaluate design alternatives. 3. Define system design methodology.
23. Describe the basics of specifying DDC control systems.	1. Describe system architecture and product evaluation. 2. Identify acceptable manufactures. 3. Relate the basic system commissioning step.
24. Define economic analysis of DDC control systems.	1. Identify fan energy saving. 2. Describe chiller staging. 3. Describe temperature adjustment.