CSC/CPE 416 Autonomous Mobile Robotics

1. CSC/CPE 416 Autonomous Mobile Robotics

2. credit units 4 contact hours 6

3. Course Coordinator: John Seng

4. Textbook: (and/or other required material) None.

5. a. Course Description: Theory and application of concepts relevant to autonomous mobile robots. Sensor and actuator interfacing, programming mobile robots, mobile robot configurations, software architectures and algorithms. 3 lectures, 1 laboratory. Crosslisted as CPE/CSC 416.

b. Prerequisite: CPE 357.

c. Required/Elective/Selective Elective for CPE, CSC, EE, SE

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6. a. Course Goals/Outcomes
The student will be able to:
- Assemble and understand micro-robot systems
- Program a microcontroller board in C
- Understand basic analog and digital sensor interfacing

b. How Student Outcomes addressed
("B" = Basic level, "I" = Intermediate level, "A" = Advanced level)

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7. Major Topics Covered: (number of lecture hours each)
- PCB assembly (robot controller board) (3 hours)
- Interfacing Sensors (2 hours)
  - analog sensors
  - digital switch sensors
- Using operational amplifiers (2 hours)
  - comparator circuits
  - buffer circuits
- Shaft encoding and quadrature encoding (2 hours)
- PID control (2 hours)
• Basic robot localization (2 hours)
• Odometry model for differential drive robots (1 hour)
• Basic vision systems (2 hours)
• Robot software architectures (1 hour)
• Neural networks (3 hours)
• Motors and control (2 hours)
• Robot Wheel Configurations (2 hours)

Final Project (6 hours)