Miami Dade College

Course Competencies Template - Form 112

GENERAL INFORMATION	
Name: Dr. Diane King	Phone #: 77021
Course Prefix/Number: ETI 4480C	Course Title: Applied Robotics
Number of Credits: 4	
Degree Type	☐ B.A. ☐ B.S. ☒ B.A.S ☐ A.A. ☐ A.S. ☐ A.A.S. ☐ C.C.C. ☐ A.T.C. ☐ V.C.C
Date Submitted/Revised: 02-26-2008	Effective Year/Term: 2009-2
☒ New Course Competency ☐ Revised Course Competency	
Course to be designated as a General Education course (part of the 36 hours of A.A. Gen. Ed. coursework): ☐ Yes ☒ No	
The above course links to the following Learning Outcomes: ☐ Communication ☒ Numbers / Data ☒ Critical thinking ☒ Information Literacy ☐ Cultural / Global Perspective	☐ Social Responsibility ☒ Ethical Issues ☒ Computer / Technology Usage ☒ Aesthetic / Creative Activities ☐ Environmental Responsibility
Course Description (limit to 50 words or less, **<u>must</u> correspond with course description on Form 102**): This is an upper division level course designed as an introduction to robotics programming and includes robotic applications for multifunction part manipulation and motion with stepper and servo-motors. Students learn topics related to robotic design including robotic vision, motion planning, sensing and sensors, actuators, navigation systems, mobility, forward and inverse kinematics, and non-holonomic path planning. Laboratory activities provide hands-on application of concepts and theories. Prerequisite: CET3126C. Laboratory fee. (2 hr lecture, 4 hr lab)	
Prerequisite(s): CET3126C	Co requisite(s):

<u>Course Competencies:</u>

Competency 1: The student will demonstrate an understanding of robotics and its history by:

1. Explaining what a robot is.
2. Explaining the general functions of a robot.
3. Discussing the origins and history of robotics.
4. Describing the design steps followed to develop a robotic system.
5. Identifying and discussing the various fields involved in construction of a robot.
6. Discussing the applications and uses of robotics.

Competency 2: The student will demonstrate an understanding of robotic (computer) vision by:

1. Explaining the basic concepts of image formation.
2. Defining and applying image projection and convolution.
3. Implementing edge detection algorithms and applying them in images.
4. Discussing and implementing image interpretation techniques.
5. Identifying stereo imaging techniques and discussing their applications.

Competency 3: The student will demonstrate an understanding of motion planning by:

1. Evaluating potential functions.
2. Designing road maps and their applications in robotics.
3. Applying cell decompositions to mobile robots.

Competency 4: The student will demonstrate an understanding of sensing, sensors, and actuators by:

1. Analyzing the correlation between human sensors and robotic sensors.
2. Applying human and animal sensing principles to robotics design.
3. Defining transduction and how it applies to sensors.
4. Interfacing various forms of sensing to microprocessors or computers.
5. Discussing complex sensors and choosing suitable interfaces.

Competency 5: The student will demonstrate an understanding of robotic navigation by:

1. Analyzing the underlying physics involved in navigation.
2. Applying the physical concepts of position, orientation, velocity, and acceleration to the design of a mobile robot.
3. Incorporating hardware sensors into a robotic navigation system.

Competency 6: The student will demonstrate an understanding of mobility in robotics by:

1. Discussing the basic concepts in mobile robotic platform designs.
2. Explaining how differential drive and skid steering are used in robotic mobility.
3. Describing the use of synchronous drives and distributed actuator arrays.
4. Distinguishing between Ackerman and articulated drives and appropriate applications.
5. Identifying the various pros and cons of each type of mobility system.
6. Creating prototypes using mobility design systems and principles.

Competency 7: The student will demonstrate an understanding of forward and inverse kinematics by:

1. Applying transformation matrices.
2. Using Diffie-Hellman (DH) Transformations.
3. Using geometric and algebraic methods as applied to kinematics.

Competency 8: The student will be able to apply non-holonomic path planning by:

1. Locating a non-holonomic constraint is in a mobile robotic system.
2. Developing mathemtical models of these systems.
3. Analyzing non-holonomic motion.
4. Analyzing case studies in robotic motion.