

**DESIGN & SIMULATION FOR ROBOTICS I**

## ROB 150- Section: [002]

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| **Credit Hours:** 3.00  **IAI Core:** | **Lab Hours:** 2.00  **IAI Majors:** | **Lecture Hours:** 2.00  **PCS: 1.2 Articulated** |
| **Semester: [Spring] Days: [Tue, Thu]** | **Course Begins: [01/14] Times: [12:30 – 2:30]** | **Course Ends: [05/08] Room: [D154]** |

**Instructor:** [Jack Brzezinski Ph.D.] **E-mail** [[jbrzezinski@mchenry.edu](mailto:jbrzezinski@mchenry.edu)] **Phone:** [8578]

**Office Hours:** [Tuesdays, 4 – 5pm or by appointment]

**Office Location:** [D161]

## Required Course:

**Textbook(s):** [No required text]

## Course Description:

Design & Simulation for Robotics I builds upon the skills learned in Introduction to Robotics and discusses fundamental aspects of 3D robot design. This course focuses on designing robotic hardware using 3D modeling tools. Students learn modeling techniques for constructing robots as well as basic simulation techniques for animating robot movements. The course is relevant to typical manufacturing, civilian and military applications, in which the robotic system needs to be tested in a virtual environment before costly production begins.

## Course Prerequisite: ROB 110 with a grade of C or higher. Course Objectives:

Upon completion of this course, the student will be able to:

# Introduction to the field of simulation

* 1. Students will describe the importance of the field of simulation
  2. Students will discuss the relationships between 3D modeling, animation and robotics
  3. Students will discuss the future of simulation and modeling technologies

1. Students will apply 3D modeling techniques to create simulated environments
2. Students will apply animation techniques to objects in simulation environments
3. Students will utilize a physics engine to create realistic simulations
4. Students will evaluate simulation system applications in manufacturing
5. Students will evaluate simulation system applications in transportation
6. Students will evaluate simulation system applications in military scenarios
7. Students will develop object rigs for complex animation

## Course Outline

1. Simulation systems: overview
2. 3D modeling software: interface and functionality
3. Creating basic objects in 3D
4. Unit setup
5. Editing and manipulating objects
6. Basic editing techniques

# Foundations of animation

1. Introduction to animation editor
2. Introduction to physics engine
3. Controlling animation through physics engine
4. Object rigs
5. Animating object rigs
6. Building simulations with rigs and physics engine
7. Final project: robotics system simulation

## Assignments and Grading Criteria

[Students will be completing the following tasks:

# Weekly notes (active participation) capturing materials discussed in class.

* Project descriptions/documentation completed in class.

The above tasks will constitute 100% of the final grade

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## Policies

**Attendance policy:** [Attendance is required]

**Late work/make-up policy:** [Special arrangements can be made]

## Weekly Course Schedule

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| --- | --- |
| **Dates of Class Meetings** | **Course Schedule** |
| Week #1 | Introduction to software design and physical system design |
| Week #2 | Introduction to software design and physical system design |
| Week #3 | Simulation for modeling complex systems |
| Week #4 | Simulation: applications and software |
| Week #5 | Designing a robotic system (part 1) |
| Week #6 | Designing a robotic system (part 2) |
| Week #7 | Designing a robotic system (part 3) |
| Week #8 | Integrating simulation with control systems (part 1) |
| Week #9 | Integrating simulation with control systems (part 2) |
| Week #10 | Design and simulation projects |
| Week #11 | Design and simulation projects |
| Week #12 | Design and simulation projects |
| Week #13 | Design and simulation projects |
| Week #14 | Design and simulation projects |

**Withdrawals:** The last day to drop this course is **[see:** [www.mchenry.edu/academiccalendar.asp](http://www.mchenry.edu/academiccalendar.asp) **].** Failure to attend class does not constitute official withdrawal. If students are considering a withdrawal, they should consult directly with the instructor and an academic advisor. Students may withdraw from a class through the Registration Office, either in person or by fax: (815) 455-3766. In their request, students should include their name, student ID number, course prefix, number and section, course title, instructor, reason for withdrawing, and their signature. Withdrawal from a course will not be accepted over the telephone.

Please refer to the following link for other important college dates: [www.mchenry.edu/academiccalendar.asp](http://www.mchenry.edu/academiccalendar.asp)

## General Education Goals:

1. Critical Thinking: To identify, define, analyze, synthesize, interpret, and evaluate ideas.
2. Information Literacy: To locate, evaluate, and use resources effectively.
3. Effective Communication: To develop, articulate, and convey meaning.
4. Ethical Awareness: To identify and make responsible choices in a diverse world.
5. Technological Literacy: To use tools skillfully.

## Assessment:

Some student work may be collected for the purpose of assessment, including student competency in the general education goals, the program, or the course.

## Effective Fall 2014: Student E-Portfolio:

The instructor of the course will designate at least one graded assignment for possible inclusion in the student E-portfolio. Students applying for an AA, AS, AFA, AES, or AGE degree must document their learning outcomes with a graded assignment for each of the five general education goals by the time of graduation. These five assignments and a cover letter will be in the student E-portfolio in Canvas.

## Academic Support for Special Populations Students

McHenry County College offers support services for students with special needs. It is the student's responsibility to meet with the Special Needs Coordinator and provide current documentation regarding his/her disability and receive information about the accommodations that are available.

In addition, as a student enrolled in a career or technical education program at McHenry County College, you may be eligible for services and assistance under the Carl D. Perkins III Grant. Grant funds are used, in part, to assist students who are at risk of not succeeding in their educational pursuits.

The traits that often prevent students from succeeding are: economic disadvantage, academic disadvantage, disability/disabilities, single parent, displaced homemaker, nontraditional, and limited English proficiency (LEP). The definitions of each trait are available in the Special Needs Office.

Students with one or more of these traits are referred to as **Perkins Special Populations Students.**

If you would like to know if you are eligible for services at anytime during the semester, please do not hesitate to contact the Special Needs Coordinator. The office is Room A260, and phone number is (815) 455-8676.

## Academic Integrity

As an educational community, McHenry County College values the pursuit of academic excellence and integrity. In accordance with this philosophy and Chapter 10, Act 5 of the 1994 Illinois Community College Act, academic dishonesty in any form, including cheating, plagiarism, and all other acts of academic theft, is considered intolerable. Appropriate sanctions, up to and including suspension from the College will be imposed by authorized College personnel.

## Copyright Policy

MCC will maintain current procedures and guidelines to ensure that all staff and students comply with applicable copyright laws and other intellectual property protection laws. The College will encourage staff and students to engage in the development of intellectual property and facilitate ownership protections with respect to such development of intellectual property.

The College expects that staff and students will act responsibly and ethically in a manner consistent with all copyright laws and College copyright procedures and guidelines. This policy authorizes the College to adopt and maintain such procedures and guidelines necessary to ensure compliance with copyright laws and to facilitate ownership protection with respect to the development of intellectual property.

## Student Code of Conduct and the Judicial Process

Consistent with the MCC mission is an expectation that students will govern themselves in terms of appropriate behavior with emphasis on self-respect and respect for others. It is the practice of the College to respect the properly exercised rights of its students. The College recognizes a student’s rights within the institution to freedom of speech, inquiry and assembly; to the peaceful pursuit of education; and to the reasonable use of services and facilities at MCC.

MCC has adopted a Student Code of Conduct and judicial process to maintain a learning environment of respect, civility, safety, and integrity for all members of the MCC community.

Whenever possible, sanctions for violations of the Student Code of Conduct may be educational in nature. However, violations affecting the health and safety of members of the MCC community are deemed to be the most serious. Therefore, acts of violence, threats or dangerous behavior are most likely to result in a suspension from the College. Violations of the academic dishonesty policy may also result in suspension or expulsion from the institution and/or reduced or failing grade.

## Children on Campus

For the safety of children on campus, children (i.e., less than 16 years of age) are not permitted on campus unattended by a parent/guardian, except when they are attending classes offered by MCC for children.

The College requires that no children be allowed into a classroom/laboratory environment, including the Testing Center, Learning Center and computer labs, solely for the purpose of a parent/guardian to provide direct supervision of his/her child.

## Teaching Schedule

The scheduling of the activities and teaching strategies on this syllabus, but not the objectives or content, may be altered at any time at the discretion of the instructor.

## Resources

The following are useful resources available to you as a student at McHenry County College:

## Advising and Transfer Center: Phone (815) 479-7565; Office A257

[www.mchenry.edu/atc](http://www.mchenry.edu/ATC/Index.asp)

## Counseling:

**Phone (815) 455-8765; Office A257**

[www.mchenry.edu/counseling](http://www.mchenry.edu/counseling)

## Financial Aid:

**Phone (815) 455-8761; Office A262**

[www.mchenry.edu/financialaid](http://www.mchenry.edu/financialaid)

## Library:

**Phone (815) 455-8533; Office A212**

[www.mchenry.edu/library](http://www.mchenry.edu/library)

## Special Needs:

**Phone (815) 455-8676; Office A260**

[www.mchenry.edu/specialneeds](http://www.mchenry.edu/specialneeds)

## Tutoring and Study Skills (Sage Learning Center): Phone (815) 455-8579; Office A247 [www.mchenry.edu/sage](http://www.mchenry.edu/sage)

This workforce solution was funded by a grant awarded by the U.S. Department of Labor’s Employment and Training Administration. The solution was created by the grantee and does not necessarily reflect the official position of the U.S. Department of Labor. The Department of Labor makes no guarantees, warranties, or assurances of any kind, express or implied, with respect to such information, including any information on linked sites and including, but not limited to, accuracy of the information or its completeness, timelines, usefulness, adequacy, continued availability, or ownership. This solution is copyrighted by the institution that created it. Internal use, by an organization and/or personal use by an individual for non-commercial purposes, is permissible. All other uses require the prior authorization of the copyright holder.