Metropolitan State University of Denver
Regular Course Syllabus

CS 490B Spring 2018
Computer Science in Manufacturing (Spring 2019)

Status	completed
Hierarchy Entities	Department of Mathematical and Computer Sciences
Approval Process Name	01. UG New Omnibus Course (17-18)
Current Step	Registrar's Office
Originator	Iliya Georgiev
Department	Department of Mathematical and Computer Sciences
Status:	Active-Hidden
Prefix:	CS
Course Number:	490B
Course Type:	Computer Science
Course Title (include Semester and date for course to run):	Computer Science in Manufacturing (Spring 2019)
Transcript Course Title:	CS in Manufacturing
Is this a study abroad course?	No
Equivalent/ Crosslisted?	
List all equivalent courses:	
List all crosslisted courses:	
Credit Hours:	4
Distribution of Credit Hours	4 (4+0)
Schedule Type:	Lecture/Lab
Grade Mode:	Letter
Lecture:	60
Lab:	0
Internship:	0
Practicum:	0
Other:	0
Additional Student Work Hours per course:	120
Specified repeatable course:	No
If yes, number of credits/ repeats allowed	
Prerequisite(s):	CS2400 and CS2050 (Computer Science 2) both with grade “C” or better Recommended courses: CS3410 and CS3250
Corequisite(s):	
Prerequisite(s) and/or Corequisite(s):	
Banner Enforced Prerequisite(s):	CS2400, CS2050
Minimum passing grade for Banner enforced prerequisite course(s):	C
Banner Enforced Corequisite(s):	

Minimum passing grade for Banner enforced corequisite course(s):	
Banner Enforced Prerequisite(s) and/or Corequisite(s):	
Minimum Passing Grade for Banner Enforced Pre/Corequsites	
Level	
Class	
Program	
Student attribute	
Major	
Other Registration Restriction(s):	
Course Description:	The course prepares students to apply computer science to the field of manufacturing engineering. They will become familiar with the issues and complexities unique to the manufacture of physical artifacts. The course will cover methods and software in the following areas: • Manufacturing management (cloud computing in manufacturing and cloud manufacturing), product life cycle management (PLM); • Imaging in manufacturing (image processing, pattern and color recognition, computer vision); • Embedded systems, robotics (general model of an abstract robot, 3D geometric modeling, Robot Operating Systems); • XML standards in manufacturing (Manufacturing Process Specification Language (PSL), STEP-XML in mechanical and electrical engineering, Electronic Data Interchange (XML-EDI), etc.).
Required Reading and Other Materials will be equivalent to:	No required book. *Some recommended sources:* Product Lifecycle Management: http://www.autodeskfusionlifecycle.com Cloud manufacturing: Cloud Manufacturing - Distributed Computing Technologies for Global and Sustainable Manufacturing, Editors: Li, Weidong, Mehnen, Jörn (Eds.), Springer Verlag Imaging: http://www.me.umn.edu/courses/me5286/vision/VisionNotes/2017/ME5286-Lecture1-2017.pdf Geometric Modeling: https://www.engr.uvic.ca/~mech410/old/2_Lecture_Notes/5_Geometric_Modeling.pdf Robotics: http://wiki.ros.org/Courses, http://wiki.ros.org/ROS/Tutorials http://www.rsl.ethz.ch/education-students/lectures/ros.html https://www.colorado.edu/cs/csci-4302-advanced-robotics

	STEP – XML: https://www.nist.gov/publications/xml-representation-step-schemas-and-data EDI XML: EDI to XML tutorial: https://msdn.microsoft.com/en-us/library/cc982596(v=bts.10).aspx PSL: www.mel.nist.gov/psl/
Specific, Measurable Student Behavioral Learning Objectives:	Upon completion of this course the student should be able to: 1. Assess the crucial role of computing in manufacturing 2. Compare the methods for computerized management in manufacturing 3. Compose electronic documents based on knowledge of computational geometrical modeling 4. Evaluate different automatic manufacturing approaches based on embedded systems and robotics 5. Appraise the visual processing pipeline: image processing, pattern recognition, computer vision 6. Judge the different manufacturing standards represented by XML vocabularies 7. Create software artifacts with open source software for manufacturing automation
Detailed Outline of Course Content (Major Topics and Subtopics) or Outline of Field Experience/ Internship	1. Computerized manufacturing management 2. Flexible manufacturing flow based on technological similarity 3. Product lifecycle management 4. Cloud computing in manufacturing 5. Cloud manufacturing 6. Visual processing in manufacturing 7. Image processing 8. Pattern recognition 9. Color recognition 10. Computer vision 11. Computerized manufacturing control 12. Embedded systems, sensors and actuators 13. Computational geometrical modeling – basic principles 14. Generalized robot model 15. Robot Operating Systems 16. Review of the XML-based manufacturing standards 17. Manufacturing Process Specification Language (PSL) 18. Mechanical engineering – XML STEP 19. Electrical Engineering – XML EDI
Evaluation of Student Performance	1. Homework Assignments, project 2. Examinations; midterm and final exams. As determined by the instructor. Written communication skills will be applied in this course.
Learning Objectives	

Steps	**Decision**	**Date**
Originator		
Iliya Georgiev	approve	01/03/2018 03:08PM
Department Curriculum Committee Chair		
Clark Dollard	approve	01/23/2018 01:40PM
Department Chair		
Lindsay Packer	approve	01/24/2018 10:37AM

Associate Dean		
Linda Lang-Peralta	approve	01/30/2018 04:50PM
Registrar's Office		
Connie Sanders	approve	02/22/2018 02:47PM