

METROPOLITAN STATE UNIVERSITY OF DENVER
Office of Academic and Student Affairs

Form Rev. 6/2015

OMNIBUS* COURSE SYLLABUS

College or School of: Letters, Arts, and Sciences

Department: Mathematical and Computer Sciences

Instructor: Iliya Georgiev

Prefix and Course Number: CS 490

Semester/year offered: Spring 2016

Banner Number (for Academic and Student Affairs use): CS 490A

(Students registering after Census date will be ineligible for the COF stipend and must pay the full tuition for the omnibus course. Please see COF-FAQ for details regarding registration deadlines: http://www.mscd.edu/news/cof/cof_faq.htm)

Course Title (30 characters or less): Embedded Systems

Schedule Type: L Grade Mode: L

Credit Hours: 4 (4+0)

Total Contact Hours per semester (assuming 15-16 week semester):

Lecture 60 Lab 0 Internship 0 Practicum _____ Other (specify type and hours): _____

Additional Student Work Hours: 120

Meeting Times/Dates: TBD

Prerequisites: CS 2400 with a grade 'C' or better

Corequisites: _____

Prerequisite(s) or Corequisite(s): _____

Banner Enforced:

Prerequisite(s): CS 2400 with a grade of C

Corequisite(s): _____

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|---|------------------|
| Approved - Omnibus course: | |
| <u>LDPacker</u> | <u>8.24.2015</u> |
| Department Chair OR Program Director | Date |
| <u>Christa Gans-Seratto</u> | <u>8/25/15</u> |
| Dean OR Associate Dean of School | Date |
| <u>[Signature]</u> | <u>8/28/15</u> |
| Office of Academic and Student Affairs Designee | Date |

*Policies as set forth in the *MSU Denver Curriculum Manual* must be followed. A copy of the omnibus course syllabus must be on file in the Office of Academic and Student Affairs prior to the listing of the course in any semester schedule.

Prerequisite(s) or Corequisite(s): _____

Registration restrictions: Level UG Class _____ Program/Major _____ Student Attribute _____

Course Description:

The course presents the basics of the embedded systems design, including specific hardware architecture and software development principles. Design principles of the hardware architecture are based on performance analysis and modeling of the embedded system structure. Students learn the organization of the processors, memory hierarchy, input/output peripherals and interfacing with sensors and actuators. Software development is based on embedded and real time operating systems and is oriented to case-studies from a selected embedded application manufacturing domains.

Required Reading

No required book.

Recommended Reading:

1. Vahid, F., Givardis, T. (2002). *Embedded Systems Design, a Unified Hardware/Software Introduction*. John Wiley and Sons Inc.
2. Wolf, M. (2014). *High-Performance Embedded Computing, second edition*. Morgan Kaufmann.

Evaluation of Student Performance:

1. Homework Assignments
2. Examinations; midterm and final exams.
3. Project

Specific Measurable Student Behavioral Learning Objectives:

Upon completion of this course the student should be able to

1. Understand and choose hardware architecture.
2. Choose effective interfacing for embedded systems.
3. Identify the design steps.
4. Design soft and real time embedded software applications.
5. Perform team-based final project that can be hardware oriented, software oriented or theoretically oriented (performance and security).

Detailed outline of course content (major topics and subtopics) or outline of field experience/ internship (experience, responsibilities and supervision):

- I. Specification of the design steps of the embedded systems, modeling.
- II. Embedded systems computer platforms
 - A. Processor and memory configuration.
 - B. Peripherals, protocols and networking.
- III. Interfacing to sensors and actuators
- IV. Software design
 - A. Embedded and real time operating systems: Linux RT, VxWorks.
 - B. Application software design with soft or hard real time requirements.
- V. Case studies: embedded manufacturing systems.
- VI. Final project

ADA SYLLABUS STATEMENT

The Metropolitan State University of Denver is committed to making reasonable accommodations to assist individuals with disabilities in reaching their academic potential. If you have a disability which may impact your performance, attendance, or grades in this class and are requesting accommodations, then you must first register with the Access Center, located in the Plaza Building, Suite 122, 303-556-8387.

The Access Center is the designated department responsible for coordinating accommodations and services for students with disabilities. Accommodations will not be granted prior to my receipt of your faculty notification letter from the Access Center. Please note that accommodations are never provided retroactively (i.e., prior to the receipt of your faculty notification letter.) Once I am in receipt of your official Access Center faculty accommodation letter, I would be happy to meet with you to discuss your accommodations. All discussions will remain confidential. Further information is available by visiting the Access center website www.msudenver.edu/access.

METROPOLITAN STATE UNIVERSITY OF DENVER GUIDELINES FOR THE PROTECTION OF HUMAN SUBJECTS

Available on the MSU Denver website:

www.msudenver.edu/irb/

This required course content MUST be part of the “Detailed outline of course content” section of the omnibus course syllabus OR a statement must be attached that clearly states how the proper procedures have been followed by the course instructor.

THE ASSOCIATE VP FOR ACADEMIC AND STUDENT AFFAIRS CANNOT SIGN AN OMNIBUS SYLLABUS THAT APPEARS TO INVOLVE HUMAN SUBJECTS AND/OR PERSONAL DATA UNLESS THIS INFORMATION IS PROVIDED.