Michigan Tech

— Course Add Proposal —

PLEASE COMPLETE THIS FORM IN RED

A guide for completing this form is located at http://www.mtu.edu/registrar/faculty-staff/course-proposal/

1) Course Information

Is this a **half-semester course proposal?** ☐ Yes ■ No

NOTE: All half-semester courses must follow rules set in Faculty Senate Proposal 4-00. See Senate website for details: https://www.mtu.edu/senate/policies-procedures/proposals-year/2002-03/10-03.pdf

Course Prefix/Number *(i.e. MEEM 2110)*: CS 4713

Course Title *(abbreviated; used on transcript - Up to **30** characters including spaces)*

Embedded Software Foundations

Alternative Title for Catalog *(Up to **100** characters including spaces)*

Foundations of Embedded Software

2) Credits

Number of credits assigned to this course 3

OR

Range of credits if **variable** ☐ to ☐ *(Number of credits to be taken in a given semester)*

3) Schedule

Contact Hours per Week *(Lec & Rec: 1 credit =1 contact hour; Lab: 1 credit =1-3 contact hours. (i.e. a 3-credit course may be 2 contact hours of lecture or recitation and up to 3 contact hours of lab OR 1 contact hour of lecture or recitation and up to 6 contact hours of lab)*

Lecture	Recitation	Lab
3		

OR

Research Course? ☐ Yes ☐ No

OR

Special Topics Course? ☐ Yes ☐ No

4) Additional Credits

May students receive **additional credits** by taking and passing this course more than once?

■ No

☐ Yes, for a maximum of _____ credits. *(Must be a multiple of the course credits, i.e. Research or Special Topics)*

☐ Yes, for an unlimited number of credits. *(i.e. Music, Varsity sports, etc.)*

5) Pass/Fail

Will this course be offered as a **pass/fail option ONLY**? *(grade of S or E)* ☐ Yes ☐ No

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6) Cross/Dual Listed Course

Cross Listed: Is there an identical course offered in a different subject? ☐ Yes ☑ No

If yes, what is the other subject and course number? _____

Dual Listed: Is there a course offered at a different level? ☐ Yes ☑ No

If yes, what is the other course number? _____

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7) Equivalent Course: Does this course replace a dropped course with no change in course content for degree requirements, prerequisites, and repeating purposes? ☐ Yes ☐ No

If yes, what is the subject and course number of the dropped course? _____

8) Corequisites and Prerequisites

Corequisites are courses that are **REQUIRED to be taken at the SAME TIME** as this course (courses MUST be offered during the same term):

Required corequisite course(s):

_____

_____

Prerequisites are courses that are **REQUIRED to be taken PRIOR** to enrollment in this course.
Select appropriate box and use parentheses where needed.

Required prerequisite course(s):

1 CS 3411

☐ And ☐ Or 2_____

☐ And ☐ Or 3_____

☐ And ☐ Or 4_____

☐ And ☐ Or 5_____

☐ And ☐ Or 6_____

A **concurrent prerequisite** is a defined prerequisite course (from list above) that **MAY** be taken **EITHER** simultaneously in the same semester **OR** in a prior semester. Indicate below applicable courses.

Concurrent prerequisite course(s):

_____

_____

_____

9) Catalog Course Description

The traditional catalog style description for a course is limited to **350 characters including spaces**. If course is proposed as a half-semester course, please include that information in the description. **Please refer to the Course Proposal Guide for examples and suggestions on developing a course description.**

Provides an introduction to the architecture of microcontrollers, the embedded software stack (starting from firmware, hardware abstraction layer, real-time operating systems, device drivers and APIs), and tool chains for programming and debugging of embedded software.

10) Registration Restrictions

- If permission is **always required** for registration purposes (a student cannot enter the course without department or instructor signature)**,** please select the appropriate permission.

Do not select unless EVERY STUDENT must get "SIGNED INTO" the class.

☐ Department **OR** ■ Instructor

- Students who register for this course may be restricted by their **College/School OR** their **Major**. Please indicate if any college or major restrictions should be applied to this course. If there are no restrictions please indicate in the check box provided.

☐ **No College/School Restrictions**

Colleges/Schools who MAY NOT enroll (EXCLUDE)

_____

-OR-

Colleges/Schools who MAY enroll (INCLUDE)

Computing, Engineering, Science

☐ **No Major Restrictions**

Majors that MAY NOT enroll (EXCLUDE)

_____

-OR-

Majors that MAY enroll (INCLUDE)

_____

-- Restrictions continued on next page --

- A restriction may also be placed on **Class Standing** (freshman, sophomore, junior, senior, graduate). Please indicate if any class restrictions should be applied to this course. If there are no restrictions please indicate in the check box provided.

☐ **No Class Restrictions**

Class of students who MAY NOT enroll (EXCLUDE)
_____
-OR-
Class of students who MAY enroll (INCLUDE)
Junior, Senior, Graduate

11) Semester(s) Offered

☒ Fall ☐ Spring ☐ Summer *(Check all that apply)*

OR ☐ On Demand

If offered in a specific semester, will the course be offered only in alternate years? ☐ Yes ☒ No

If yes, what will be the starting academic year? *(i.e. 2014-15 or 2015-16)*_____

12) Essential Education

Is this course being proposed for Essential Education? Yes ☐ No ☒

Essential Education proposal forms are available at: http://www.mtu.edu/registrar/faculty-staff/course-proposal/.

13) Course Computing Lab and Expendables Fees

DO NOT RECORD FEE INFORMATION HERE. Submit new course fee information on the New Course Fees Form available at: http://www.mtu.edu/registrar/faculty-staff/course-proposal/.

14) Course Learning Objectives (Required)

Upon successful completion of this course, students will be able to:

CLO#1: explain the layers of the software stack in embedded computing systems.
CLO#2: articulate the relation between the layers of the software stack.
CLO#3: analyze how an application request is serviced through the software stack.
CLO#4: use programming and debugging tools for the development of embedded software.

15) Degree Programs which this course will affect

List the degrees, minors, and certificates in which this course will be required or used as an elective: ***

Degree Program(s):
Computer Science
Software Engineering
Computer Engineering

***** Be sure to adjust the appropriate degree audits in sections 7 and 8 in your department's binder.**

16) Course Rationale *(Required)*

Embedded Computing Systems (ECS) are computing systems that are included in larger physical systems and control their activities. Examples include the processors that control the engine and stability of cars. ECS have become an integral part of our daily life and their safety is crucial to the well-being of the society at large. As such, it is highly important to train computing and engineering graduates who will land a position that involves the programming of ECS. This course provides a foundational understanding of how software systems in an ECS work and communicate with each other. Moreover, students will learn about the programming paradigms and tools that can help them towards the development of programs for ECS.

17) Faculty Contact

Faculty proposing this course *(please print)*: Name Ali Ebnenasir

Email aebnenas@mtu.edu

DID YOU USE RED INK TO COMPLETE THIS FORM?

IF NOT, PLEASE HIGHLIGHT YOUR ANSWERS SO NOTHING IS MISSED IN PROCESSING.