

# ECE 5465: Advanced Microcomputers

## Course Description

An investigation of current microcomputer structures with emphasis on hardware implementation of I/O, direct memory access, interrupts, memory, and microprogramming.

**Prior Course Number:** ECE 765

**Transcript Abbreviation:** Adv Microcomp

**Grading Plan:** Letter Grade

**Course Deliveries:** Classroom

**Course Levels:** Undergrad, Graduate

**Student Ranks:** Junior, Senior, Masters, Doctoral

**Course Offerings:** Spring

**Flex Scheduled Course:** Never

**Course Frequency:** Every Year

**Course Length:** 14 Week

**Credits:** 3.0

**Repeatable:** No

**Time Distribution:** 3.0 hr Lec

**Expected out-of-class hours per week:** 6.0

**Graded Component:** Lecture

**Credit by Examination:** No

**Admission Condition:** No

**Off Campus:** Never

**Campus Locations:** Columbus

**Prerequisites and Co-requisites:** Prereq: 5362, or 662 and 694A, or Grad standing in Engineering.

**Exclusions:** Not open to students with credit for 765.

**Cross-Listings:**

**Course Rationale:** Existing course.

**The course is required for this unit's degrees, majors, and/or minors:** No

**The course is a GEC:** No

**The course is an elective (for this or other units) or is a service course for other units:** Yes

**Subject/CIP Code:** 14.0902

**Subsidy Level:** Doctoral Course

## Programs

| Abbreviation | Description            |
|--------------|------------------------|
| CpE          | Computer Engineering   |
| EE           | Electrical Engineering |

## Course Goals

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| Learn the architecture of an advanced microprocessor and microcontroller   |
| Learn to evaluate and use peripheral support devices such a memory, parallel ports, serial ports, real time clocks       |
| Learn how to design large-scale embedded microprocessor and microcontroller based systems                                |
| Learn how to develop advanced software to control real-time embedded systems including interrupts and exception handling |

## Course Topics

| Topic  | Lec | Rec | Lab | Cli | IS | Sem | FE | Wor |
|--|-----|-----|-----|-----|----|-----|----|-----|
| Architecture, programmer's model, and application of a 16/32 bit microprocessor. | 8.0 |     |     |     |    |     |    |     |
| Assembly language programming.   | 4.0 |     |     |     |    |     |    |     |
| Interrupt and exception handling   | 5.0 |     |     |     |    |     |    |     |
| I/O support devices and interfacing  | 7.0 |     |     |     |    |     |    |     |
| Memory types and applications: static, dynamic, DMA                              | 3.0 |     |     |     |    |     |    |     |
| Introduction to a modern microcontroller(s)                                      | 8.0 |     |     |     |    |     |    |     |
| Design examples  | 6.0 |     |     |     |    |     |    |     |

## Representative Assignments

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|--|
| Homework problems corresponding to lecture material. Interface designs, interface program assembler code, and code segments. |
| Interfacing project using modern simulation tools.   |

## Grades

| Aspect                           | Percent |
|----------------------------------|---------|
| Midterm Exam(s)                  | 25%     |
| Homework/Projects                | 20%     |
| Microcomputer Architecture Paper | 10%     |
| Quizzes                          | 15%     |
| Final Exam                       | 30%     |

## Representative Textbooks and Other Course Materials

| Title   | Author                       |
|---|------------------------------|
| <i>ARM Microprocessor Systems Cortex-M Architecture, Programming, and Interfacing</i> | Muhammad Tahr and Kashif ave |

## ABET-EAC Criterion 3 Outcomes

| Course Contribution | College Outcome   |
|---------------------|---|
| ***                 | a An ability to apply knowledge of mathematics, science, and engineering.   |
| *                   | b An ability to design and conduct experiments, as well as to analyze and interpret data.                           |
| ***                 | c An ability to design a system, component, or process to meet desired needs.                                       |
|                     | d An ability to function on multi-disciplinary teams.   |
| ***                 | e An ability to identify, formulate, and solve engineering problems.  |
|                     | f An understanding of professional and ethical responsibility.  |
| *                   | g An ability to communicate effectively.  |
|                     | h The broad education necessary to understand the impact of engineering solutions in a global and societal context. |
| *                   | i A recognition of the need for, and an ability to engage in life-long learning.                                    |
|                     | j A knowledge of contemporary issues.   |

| Course Contribution | College Outcome  |
|---------------------|--|
| ***                 | k An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice. |

**Additional Notes or Comments**

update rereqs, exclusion, goals and topics to match university format.  
updated text info, 5/10/17, CED

change text to Tahir and Javed BLA 4/4/19

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