

**University of Maine — ECE571: Advanced Microprocessor-Based Design**  
Fall 2020

**Instructor:**

Vincent Weaver  
e-mail: [vincent.weaver@maine.edu](mailto:vincent.weaver@maine.edu)  
Office: Barrows 203  
Office Hours: e-mail to arrange an appointment

**Course Website:**

[http://web.eece.maine.edu/~vweaver/classes/ece571\\_2020f/](http://web.eece.maine.edu/~vweaver/classes/ece571_2020f/)

**Course Schedule:**

Lectures: Monday/Wednesday/Friday 12:00pm-12:50pm, Barrows 228

**Course Listing:**

Includes techniques for developing software and hardware for microprocessor-based systems, computer aided design using a multistation logic development system, use of components commonly found in microprocessor-based systems. Lec 2, Lab 3. (Spring.)

**Content this Semester**

We will investigate modern systems, with a focus on ARM and x86 processors. We will investigate various metrics for evaluating such systems, including performance, power, energy, and code density.

**Pre-requisites:**

ECE471 or permission  
Ideally you have C programming and basic Linux knowledge.

**After this class you will be able to:**

- Know the features and limitations when measuring performance using Hardware Performance Counters
- Understand the various Energy and Power metrics used when analyzing modern computer systems
- Be able to conduct power and performance analysis using the Linux operating system.
- Know the power and performance implications of various architectural features, including Superscalar, Out-of-order, Hardware Multi-threading, Caches, and Branch Predictors.
- Know the power and performance implications of various pieces of hardware, including CPU, GPU, Memory, and Disks.
- Know the power and performance implications of the x86 and ARM architectures.

## **Grading:**

Class Participation (5%)

11 homework assignments (5% each), Lowest is dropped

1 midterm exam, tentatively scheduled 23 October (20% total)

1 final project (25%)

## **Assignments:**

Assignments and class notes will be posted to the course website.

Announcements, including homework assignments, will be sent to your UMaine e-mail address.

Homework assignments will be submitted via e-mail.

**Late Work:** Late work is penalized at 10% a day.

## **Optional Book:**

*Computer Organization and Design: The Hardware / Software Interface* by Patterson and Hennessy.

Note, the 2007 edition of this book can be read free online via the UMaine library.

## **University of Maine Required Statements**

### **Academic Honesty Statement**

Academic honesty is very important. It is dishonest to cheat on exams, to copy term papers, to submit papers written by another person, to fake experimental results, or to copy or reword parts of books or articles into your own papers without appropriately citing the source. Students committing or aiding in any of these violations may be given failing grades for an assignment or for an entire course, at the discretion of the instructor. In addition to any academic action taken by an instructor, these violations are also subject to action under the University of Maine Student Conduct Code. The maximum possible sanction under the student conduct code is dismissal from the University. Please see the University of Maine System's Academic Integrity Policy listed in the Board Policy Manual as Policy 314: <https://www.maine.edu/board-of-trustees/policy-manual/section-314/>

### **Students with disabilities statement**

If you have a disability for which you may be requesting an accommodation, please contact Student Accessibility Services, 121 East Annex, 581.2319, as early as possible in the term. Students who have already been approved for accommodations by SAS and have a current accommodation letter should meet with me (the instructor of the course) privately as soon as possible.

### **Course Schedule Disclaimer (Disruption Clause)**

In the event of an extended disruption of normal classroom activities (due to COVID-19 or other long-term disruptions), the format for this course may be modified to enable its completion within its programmed time frame. In that event, you will be provided an addendum to the syllabus that will supersede this version.

### **COVID-19**

COVID-19 is an infectious disease caused by the coronavirus SARS-CoV-2. The virus is transmitted person-to-person through respiratory droplets that are expelled when breathing, talking, eating, coughing or sneezing. Additionally, the virus is stable on surfaces and can be transmitted when someone touches a contaminated surface and transfers the virus to their nose or mouth. When someone becomes infected with COVID-19 they may either have no symptoms or symptoms that range from mild to severe and can even be fatal. During this global pandemic, it is imperative that

all students, faculty, and staff abide by the safety protocols and guidelines set forth by the university to ensure the safety of our campus. All students are encouraged to make the Black Bears Care Pact to protect the health of themselves, the health of others, and the college of our hearts always.

### **Observance of Religious Holidays/Events**

The University of Maine recognizes that when students are observing significant religious holidays, some may be unable to attend classes or labs, study, take tests, or work on other assignments. If they provide adequate notice (at least one week and longer if at all possible), these students are allowed to make up course requirements as long as this effort does not create an unreasonable burden upon the instructor, department or University. At the discretion of the instructor, such coursework could be due before or after the examination or assignment. No adverse or prejudicial effects shall result to a student's grade for the examination, study, or course requirement on the day of religious observance. The student shall not be marked absent from the class due to observing a significant religious holiday. In the case of an internship or clinical, students should refer to the applicable policy in place by the employer or site.

### **Sexual Discrimination Reporting**

The University of Maine is committed to making campus a safe place for students. Because of this commitment, if you tell a teacher about an experience of sexual assault, sexual harassment, stalking, relationship abuse (dating violence and domestic violence), sexual misconduct or any form of gender discrimination involving members of the campus, your teacher is required to report this information to Title IX Student Services or the Office of Equal Opportunity.

If you want to talk in confidence to someone about an experience of sexual discrimination, please contact these resources:

For confidential resources on campus: Counseling Center: 207-581-1392 or Cutler Health Center: at 207-581-4000.

For confidential resources off campus: Rape Response Services: 1-800-871-7741 or Partners for Peace: 1-800-863-9909.

Other resources: The resources listed below can offer support but may have to report the incident to others who can help:

For support services on campus: Title IX Student Services: 207-581-1406, Office of Community Standards: 207-581-1409, University of Maine Police: 207-581-4040 or 911. Or see the OSAVP website <https://umaine.edu/titleix/> for a complete list of services.