ECEC-355: Computer Organization & Architecture

Electrical and Computer Engineering Department

Drexel University

SYLLABUS

Header and Cover:

Course Prefix and Number: ECEC-355
Credit Hours: 3
Course Title: Computer Organization & Architecture
Term: Winter 2021

Instructor Information:

Name: Dr. Anup K. Das
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Course Delivery:

Join Zoom Meeting
https://drexel.zoom.us/j/5397346922

Meeting ID: 539 734 6922
One tap mobile
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Find your local number: https://drexel.zoom.us/u/kSWXqd9Jc

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162.255.36.11 (US East)
115.114.131.7 (India Mumbai)
115.114.115.7 (India Hyderabad)
213.19.144.110 (Amsterdam Netherlands)
213.244.140.110 (Germany)
103.122.166.55 (Australia)
149.137.40.110 (Singapore)
64.211.144.160 (Brazil)
69.174.57.160 (Canada)
207.226.132.110 (Japan)
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Course Description

This course will cover the principles of designing microprocessors using solid engineering fundamentals and quantitative cost/performance trade-offs. Topics will cover instruction set architectures, arithmetic for computers, assessing and understanding processor performance, processor datapath and control, and pipelining.

Course Outcome

At the end of this course, students will be able to understand the tradeoffs associated with design decisions at the computer architecture and how it affects the computing stacks above and below. This will help them to reason and answer why a computer is

designed the way it is. The course will also introduce the students on core concepts essential for the design of future computing systems.

Course Material

Reference Textbook: D. Patterson and J. Hennessy, *Computer Organization and Design RISC-V Edition: The Hardware Software Interface (The Morgan Kaufmann Series in Computer Architecture and Design) 1st Edition*.

Lecture material will be provided by the instructor.

Student Learning Information

Prerequisites: ECEC 302: Digital Systems Projects, ECEC 353: Systems Programming

Tentative list of topics to be covered

a. Computer architecture fundamentals
b. RISC-V Instruction Set Architecture Tradeoffs
c. Overview of other ISAs
d. Single-cycle Microarchitecture
e. Multi-cycle Microarchitecture
f. Pipeline Microarchitecture
g. Issues in Pipeline Design

Total Grade: 100 points

1. Online Quiz (5): 40
2. Project (5): 40
3. Homework (2): 20

The Academic Policies of Drexel University Office of the Provost dictates the scale of letter grades http://www.drexel.edu/provost/policies/grades.asp. Below are the percentages to be used in assignment of these grades:

Letter Grade percentage A+ 100–97, A 96.9 – 93, A- 92.9 – 90, B+ 89.9 – 87, B 86.9 – 83, B- 82.9 – 80, C+ 79.9 – 77, C 76.9 – 73, C- 72.9 – 70, D+ 69.9 – 67, D 66.9 – 63, F Below 63

The instructor reserves the right to adjust the grade percentages (e.g. based on the distribution of grades) to accommodate non-standard (low or high) distributions.

Academic Policies

Course-Specific Policies

- **Quiz Policy:** Quizzes are all online. Students will use personal mobile devices or laptops to complete quizzes.

- **Project Policy:** Projects is always to be submitted on or before the date on which it is due. Projects submitted after the due date will be accepted with penalty. Project must be submitted using Black Board Learn unless otherwise instructed. Assignments must never be submitted via e-mail.

- **Examination Policy:** All exams in the course are closed-textbook and closed-"reading assignment material." Use of other books or any other material (such as solutions to homework assignments), however, is not permitted. Use of cell phones, laptops, tablets, PDAs, or any other device capable of wireless communication is prohibited. Exams will cover material discussed in the lectures, homework assignments, or textbook sections given as reading assignments. For example, the exams may include questions on material covered in class lectures or homework but not specifically covered in the textbook. Similarly, the exams may include any material covered in a section of the textbook given as a reading assignment but not specifically covered in the lectures or homework.

- **Absentee Policy:** Absence from examinations will be excused only under extraordinary circumstances such as medical or family emergencies. A missed examination without prior approval and without legitimate reason will be graded at zero points. An absence will be excused only if the student is able to provide legitimate documentation (such as a physician note). An absence from an examination with prior approval will require the student to take an alternate exam at a later time. Special examinations will not be held earlier or on later dates to accommodate, for example, flight schedules for overseas vacations.

University Academic Policies

- **Missed Classes:** Absence from class will be based on the University's absence policy. Please review the link below.
    - http://drexel.edu/provost/policies/absence/

- **Academic Integrity, Plagiarism and Cheating Policy:** Each student is expected to complete all assignments independently unless otherwise explicitly instructed. It is unacceptable to copy another student's work or solutions from any other source. Submitted assignments will be checked for plagiarism using Stanford's MOSS plagiarism detection system (https://theory.stanford.edu/~aiken/moss/). Violators of this policy will be reported to the Office of Student Conduct and Community

Standards (SCCS). Academic integrity violations could result in failure for the course or the assignment among other sanctions determined by the instructor. A second violation of the academic integrity policy will likely result in suspension. Please review the University's policy regarding academic integrity at:
http://drexel.edu/provost/policies/academic-integrity/
http://drexel.edu/studentlife/community_standards/studentHandbook/

- **Office of Equality and Diversity - Disability Resources:** Students requesting accommodations due to a disability at Drexel University need to request a current Accommodations Verification Letter (AVL) in the ClockWork database before accommodations can be made. These requests are received by Disability Resources (DR), who then issues the AVL to the appropriate contacts. For additional information, visit the DR website at drexel.edu/oed/disabilityResources/overview/, or contact DR for more information by phone at 215.895.1401, or by email at disability@drexel.edu.

- **Drexel Coronavirus Information**

  Students should refer to the following links for Drexel's Coronavirus Information.

  https://drexel.edu/coronavirus/

  https://drexel.edu/coronavirus/health-safety/monitor-your-health/if-you-feel-sick/

- **Drexel's commitment to Diversity and Inclusion:**
  https://drexel.edu/studentlife/diversity/overview/

- **Course Drop Policy:**
  http://drexel.edu/provost/policies/course-add-drop/

- **Course Withdrawal Policy:**

  http://drexel.edu/provost/policies/course-withdrawal/

- **Course Change Policy:** The instructor reserves the right to modify the course, as necessary, during the term: including policies, evaluations, due dates, course content, schedule, assignments or requirements. All changes will be communicated in lecture and/or *via* the course *DrexelLearn* page.
- **Weather, Emergencies and University Closing:** University closing or delayed opening information will be posted on www.drexel.edu. In the event of the need to close or delay the daily opening of a campus, the University will provide notice *via* Web, telephone, and the DrexelALERT system. Closing or delayed opening information will be announced at 215-895-MELT (6358). The University

determines whether to close or delay opening due to inclement weather, not the instructor. Therefore, please do not contact the instructor for this information.