Foundations of Computer Organization and Architecture COSC 5313  
School of Engineering and Computing Sciences  
Spring 2015

A. COURSE INFORMATION

Course number/section: COSC 5313  
Class meeting time: MWF 9:00 a.m. – 9:50 a.m.  
Class location: CS-156  
Course Website: TBD

B. INSTRUCTOR INFORMATION

Instructor: Dr. Dulal Kar  
Office location: CI 321  
Office hours: TBD  
Telephone: 361-825-5878  
e-mail: dulal.kar@tamucc.edu  
Appointments: Required for meetings beyond office hours

C. COURSE DESCRIPTION

An overview of computer architecture, which stresses the underlying design principles and the impact of these principles on computer performance. General topics include design methodology, processor design, control design, memory organization, system organization, and parallel processing.

D. PREREQUISITES AND COREQUISITES

None.

E. REQUIRED TEXTBOOK(S), READINGS AND SUPPLIES


Optional Textbook(s) or Other References

None

Supplies

None

F. STUDENT LEARNING OUTCOMES AND ASSESSMENT

Assessment is a process used by instructors to help improve learning. Assessment is essential for effective learning because it provides feedback to both students and instructors. A critical step in this process is making clear the course’s student learning outcomes that
describe what students are expected to learn to be successful in the course. The student learning outcomes for this course are listed below. By collecting data and sharing it with students on how well they are accomplishing these learning outcomes students can more efficiently and effectively focus their learning efforts. This information can also help instructors identify challenging areas for students and adjust their teaching approach to facilitate learning.

By the end of this course, students should be able to:

1. Explain functionalities of various digital components that are used in the organization and design of digital systems
2. Optimize a design for a digital system
3. Follow the steps that a designer must go through in order to design an elementary basic computer
4. Explain with how data is represented internally in different computer platforms
5. Explain how instructions are represented and executed in different computer platforms
6. Explain organization of various computer systems including accumulator machines, stack machines and general purpose register machines, instruction types including arithmetic, data movement and control, instruction formats and addressing modes.
7. Design a processor’s arithmetic and control units at basic level
8. Explain and use pipelining techniques and cache memory for the purpose of performance improvement

G. INSTRUCTIONAL METHODS AND ACTIVITIES

Lectures using online electronic documents and slides.

H. MAJOR COURSE REQUIREMENTS AND GRADING

This is an intermediate course. However, this is a difficult course that demands all students attend all classes! Regular completion of all reading, homework, and other outside assignments, are absolutely essential for success in this course. We will follow the text generally, but non-text material may also be included in the lectures. Except the final exam, all the assignments, quizzes and exams will be given during the class hours. You are responsible for all the material presented during the lecture.

Assignments: About eight to ten quizzes and homework assignments will be given. Partial credit will be given for incomplete assignments. Assignments will significantly build on the material from the lectures. Hard copies of the assignments will be handed out in the class.

Exams: The first mid-term exam will be given on February 25, 2015, and the second mid-term exam will be given on April 8, 2015 during the scheduled class time. The final exam will be comprehensive and will be given on the day and time according to the university schedule. Exams will cover all lecture and reading material from the text. Often exam and quiz questions are similar to the problems assigned in homework assignments.
Paper: Several research papers (or a list of links to papers) will be distributed early in the class with some specific guidelines so that you may start thinking about the term paper immediately and accordingly develop an idea what to write for your paper. You may decide to write a survey paper or a paper based on comparative study of contemporary computer systems. More details regarding the term paper will be provided later in the class.

<table>
<thead>
<tr>
<th>ACTIVITY</th>
<th>% of FINAL GRADE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exam 1</td>
<td>20</td>
</tr>
<tr>
<td>Exam 2</td>
<td>20</td>
</tr>
<tr>
<td>Final Exam</td>
<td>25</td>
</tr>
<tr>
<td>Homework and Quizzes</td>
<td>20</td>
</tr>
<tr>
<td>Paper</td>
<td>15</td>
</tr>
</tbody>
</table>

I. COURSE CONTENT/SCHEDULE

<table>
<thead>
<tr>
<th>DATE (BY DAY OR WEEK)</th>
<th>TOPIC</th>
<th>CHAPTER(S)</th>
<th>ASSIGNMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weeks 1-4</td>
<td>Data Representation, Boolean Algebra, Map Simplification,</td>
<td>Chapter 1 and Chapter 3</td>
<td>HW1, HW2</td>
</tr>
<tr>
<td></td>
<td>Combinational Circuits</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weeks 4-5</td>
<td>Digital Components</td>
<td>Chapter 2</td>
<td>HW3</td>
</tr>
<tr>
<td></td>
<td>Midterm Exam 1, February 25, 2015</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weeks 5-8</td>
<td>Sequential Circuits, Register Transfer and Microoperations,</td>
<td>Chapter 1, Chapter 2, and Chapter 4</td>
<td>HW4, HW5</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weeks 8-11</td>
<td>Central Processing Unit</td>
<td>Chapter 8</td>
<td>HW6</td>
</tr>
<tr>
<td></td>
<td>Midterm Exam 2, April 8, 2015</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weeks 11-12</td>
<td>Basic Computer Organization and Design</td>
<td>Chapter 5</td>
<td>HW7</td>
</tr>
<tr>
<td>Weeks 13-15</td>
<td>Pipeline and Vector Processing, Memory Organization</td>
<td>Chapter 9 and Chapter 12</td>
<td>HW8</td>
</tr>
<tr>
<td></td>
<td>Final Exam</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: Changes in this course schedule may be necessary and will be announced to the class by the Instructor. The assignments and exams shown are directly related to the Student Learning Outcomes described in Section F.
J. COURSE POLICIES

Attendance/Tardiness
You must attend all classes. You are responsible for any materials covered or handed out or announcements made for the tests, quizzes, and homework assignments in your absence. Records of your attendance will be maintained and reported to the university. Students found missing classes without the instructor's permission will be automatically withdrawn from the course. Students are responsible for all materials covered in class and assigned. Should a student be absent from class, it is his/her responsibility to get the notes, etc. for that missed class. More important, should there be assignments, it is the student’s responsibility to obtain such assignments. No excuse will be accepted for assignments not turned in because the student was absent when it was due.

Late Work and Make-up Exams

All the assignments are due at the beginning of the class on the due date. If the student is absent on the assignment due date, it is the student's responsibility to make sure that the assignment is submitted on the designated date. An assignment that is turned in after the class on the due date is considered one day late. There is a penalty for late submissions. Late assignments will be counted 20% off for each day after the due time. No credit will be given if an assignment is submitted after 5 days. If you have not completed your assignment by the due date, you should submit the work you have done for partial credit. No work will be accepted once the graded work has been returned or the solution has been disclosed to the class, except for unusual circumstances. Exams must be taken on the hour they are scheduled. In the event, if you cannot attend the class to take the exam due to some emergency or some unavoidable situation (such as serious illness, death in the family, participation in university sports, religious observations, and so on) you must notify me as soon as possible before the exam and also you must validate your absence by providing me a document (e.g., with a letter from your doctor).

Extra Credit
None.

Cell Phone Use
Set your cell phone/electronic device in silent mode when you are in class.

Laptop Use
You can use your laptop to view course documents or slides.

Food in Class
Not allowed.

Missed Exam
No makeup exam will be given without prior agreement.
Participation
You are encouraged to ask questions related to course topics that can help you and others attending the class.

K. COLLEGE AND UNIVERSITY POLICIES

- **Academic Integrity (University)**
  It is expected that university students will demonstrate a high level of maturity, self-direction, and ability to manage their own affairs. Students are viewed as individuals who possess the qualities of worth, dignity, and the capacity for self-direction in personal behavior.
  See Full University Policy at [http://catalog.tamucc.edu/content.php?catoid=10&navoid=313#Academic_Integrity](http://catalog.tamucc.edu/content.php?catoid=10&navoid=313#Academic_Integrity)

- **Classroom/Professional Behavior**
  Texas A&M University-Corpus Christi, as an academic community, requires that each individual respect the needs of others to study and learn in a peaceful atmosphere. Under Article III of the Student Code of Conduct, classroom behavior that interferes with either (a) the instructor’s ability to conduct the class or (b) the ability of other students to profit from the instructional program may be considered a breach of the peace and is subject to disciplinary sanction outlined in article VII of the Student Code of Conduct. Students engaging in unacceptable behavior may be instructed to leave the classroom. This prohibition applies to all instructional forums, including classrooms, electronic classrooms, labs, discussion groups, field trips, etc.

- **Deadline for Dropping a Course with a Grade of W (University)**
  The grade of W will be assigned to any student officially dropping a course by Friday, April 10, 2015. No student is eligible to receive a W without completing the official drop process by this deadline. Visit the Office of the University Registrar for the Course Drop Form that must be submitted. After April 10, 2015 a student will not be allowed to drop a course.

- **Grade Appeals (College of Science and Engineering)**
  As stated in University Procedure 13.02.99.C2.01, Student Grade Appeal Procedures, a student who believes that he or she has not been held to appropriate academic standards as outlined in the class syllabus, equitable evaluation procedures, or appropriate grading, may appeal the final grade given in the course. The burden of proof is upon the student to demonstrate the appropriateness of the appeal. A student with a complaint about a grade is encouraged to first discuss the matter with the instructor. For complete details, including the responsibilities of the parties involved in the process and the number of days allowed for completing the steps in the process, see University Procedure 13.02.99.C2.01, Student Grade Appeal Procedures. These documents are accessible through the University Rules website at [http://www.tamucc.edu/provost/university_rules/index.html](http://www.tamucc.edu/provost/university_rules/index.html), and the College of Science
and Engineering Grade Appeals webpage at http://sci.tamucc.edu/students/GradeAppeal.html. For assistance and/or guidance in the grade appeal process, students may contact the chair or director of the appropriate department or school, the Office of the College of Science and Engineering Dean, or the Office of the Provost.

- **Disability Services**
  Disability Services (DS) is the hub for coordinating services and accommodations to ensure accessibility and utilization of all programs for all Texas A&M University-Corpus Christi students with disabilities. Our services are designed to meet the unique educational needs of enrolled students with documented permanent or temporary disabilities. DS provides intake and consultation services to students seeking to register with our office. DS reviews an individual’s documentation of disability and assesses eligibility for services and the determination of reasonable accommodations. For more information visit the Disability Services Office at 116 Corpus Christi Hall or go to http://disabilityservices.tamucc.edu/

- **Statement of Civility**
  Texas A&M University-Corpus Christi has a diverse student population that represents the population of the state. Our goal is to provide you with a high quality educational experience that is free from repression. You are responsible for following the rules of the University, city, state and federal government. We expect that you will behave in a manner that is dignified, respectful and courteous to all people, regardless of sex, ethnic/racial origin, religious background, sexual orientation or disability. Behaviors that infringe on the rights of another individual will not be tolerated.

L. **OTHER INFORMATION**

In the event of an unforeseen adverse event, such as a major hurricane and classes could not be held on the campus of Texas A&M University–Corpus Christi; this course would continue through the use of Blackboard and/or email. In addition, the syllabus and class activities may be modified to allow continuation of the course. Ideally, University facilities (i.e., emails, web sites, and Blackboard) will be operational within two days of the closing of the physical campus. However, students need to make certain that the course instructor has a primary and a secondary means of contacting each student.

**GENERAL DISCLAIMER**

I reserve the right to modify the information, schedule, assignments, deadlines, and course policies in this syllabus if and when necessary. I will announce such changes in a timely manner during regularly scheduled lecture periods.