CMPE 364 - Spring 2017
Microprocessor Based Design

Qatar University

L51: Su, Tu, Th 10:00am-10:50am in Female Engineering 0153
L52: Su, Tu, Th 8:00am-8:50am in Female Engineering 0248

Instructor:	Dr. Ryan Riley
Office:	CSE 205 (Engineering Annex, Male Campus)
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Textbook

Introduction to Microprocessor Based Systems Using the ARM Processor, 2nd Edition, by By Kris Schindler. ISBN-13: 978-1256976950.

Course Topics

Fundamentals and evolution of microprocessors. Architecture of a 16-bit microprocessor, assembly language and its development tools; data transfer; arithmetic logic, program control instructions; interrupt organization; memory interface and address decoding; input/output, programmable peripheral, serial input/output interfacing; universal synchronous and asynchronous receivers and transmitters; hardware interrupts, basic interrupt interface, programmable interrupt controllers; analog-digital converters; 32-bit programming

Grading

Final grades will be assigned according to the following *approximate* weighting:

Quizzes	15%
Homework	15%
Exam 1	20%
Exam 2	20%
Final Exam	30%

Grades are earned by you. I do not negotiate over grades.

Exam Dates

Exam 1: Tuesday, March 28, in class.
Exam 2: Tuesday, May 9, in class.

Course Objectives

1. Give student an overview of the ARM Processor

2. Teach the student assembly language and machine language beside a high level language of the ARM family.

3. Teach the student how to utilize the IO capabilities of the ARM processor to easy connection and interfacing it to other IO devices like memory chips, ADC, DAC, and other simple input/output hardware.

4. Introduce the student to computer based system design and implementation dependent on ARM microprocessors.

Course Learning Outcomes (CLO)

1. Understand the architecture of ARM Microprocessors

2. Write and analyze an assembly program

3. Design small software/hardware systems

4. Design a hardware interfacing circuit comprising a microprocessor and supporting ICs.

Regrade Policy

If you believe an error was made in the grading of a homework or exam, you may request a regrade of the assignment. In order to request a regrade prepare a written explanation of where you believe the error in grading occurred as well as the number of additional points you believe you should have received. Attach this explanation to your returned assignment and submit it to the course professor for a regrade. You may submit only one regrade request per assignment, and the results of that regrade are final.

Please note that your *entire* assignment will then be regraded and your new grade assigned appropriately. This means that there is a distinct, but unlikely, possibility that as a result of a regrade your grade on the assignment will go down.

A regrade request must be submitted within *one week* after the graded work has been returned to the class. It is your responsibility to pick up the graded work on time. Regrade requests will not be accepted after the one week period.

Your Name

Professionalism is an important part of engineering and science. As such, you are required to choose one, consistent spelling and format for your name and use it on all assignments turned in for this class. Points will be deducted from work that is submitted with a misspelled or inconsistent name.

For example, if you were the president of this university ONE of the following could potentially be used as your name in this class:

- Hassan Al-Derham (His choice.)
- Hasan Rashid Al-Derham
- Hassan Rachid
- Hassan AlDirham

Simply choose one, and be consistent.

Homework Submission Format

When submitting a written assignment:

1. You may submit only one document.
2. Your one document must be in PDF format.
3. You must submit your work via Gradescope. (No e-mail submission.) If you are late for any reason and the submission link is unavailable, you cannot submit. (So, submit early and submit often.)

Make-Up Exam/Quiz Policy

Make-up exams or quizzes will not be given. It is your responsibility to ensure that you attend scheduled exams.

Late Work Policy

For each assignment, I will announce when it is due and how to turn in the work. Late work will not be accepted except as follows:

During the semester, students have three late days they may use to turn in homework assignments late. A student may use at most two late days on a single assignment. If a student submits late but does not have enough late days remaining, the assignment will NOT be graded.

Academic Integrity

As a student at Qatar University you are subject to the Student Integrity code, which enjoins you to respect the highest standards of honesty and integrity. All work that you submit in this course must be your own; unauthorized group efforts are considered academic dishonesty. See the student handbook at `http://www.qu.edu.qa/students/handbook.php` for definitions and sanctions. Academic dishonesty is a serious offense which may result in suspension or expulsion from the University. Students are encouraged to report academic dishonesty to me directly. You may discuss assignments in a general way with other students, but you may not consult any one else's written work. Some examples of actions which would make you guilty of academic dishonesty are:

- You examine another student's solution to a written or programming assignment
- You allow another student to examine your solution to a written or programming assignment
- You fail to take reasonable care to prevent another student from examining your solution to a written or programming assignment and that student does examine your solution. For example, if you allow another student to check his/her email from your terminal while you step out of the room, you have failed to take reasonable care to prevent him/her from accessing your files.

In addition, it is unwise and I strongly discourage you from sitting next to or nearby your friend or classmate while you both work on an assignment.

Automatic tools will be used to compare your programming solutions to those of every other current or past student. Don't con yourself into thinking you can hide any collaboration. The risk of getting caught is too high, and the standard penalty is way too high (grade of F).

If I find reason to believe that a student has cheated on any assignment, I may inform the student promptly, or I may decide to silently accumulate evidence against the student on later assignments.

[As an interesting side note, this section on academic dishonesty is largely copied from Dr. Antony Hosking's (`http://www.cs.purdue.edu/homes/hosking/Antony_Hosking/Home.html`) policy pages from previous semesters. One of the major differences between plagiarism and proper reuse is giving credit where credit is due.]

Students With Special Needs

It is Qatar University policy to provide educational opportunities that ensure fair, appropriate and reasonable accommodation to students who have disabilities that may affect their ability to participate in course activities or meet course requirements. Students with disabilities are encouraged to contact their Instructor to ensure that their individual needs are met. The University through its Special Need section will exert all efforts to accommodate for individuals needs.

Special Needs Section:	
Female Telephone:	(00974) 4403 3843
Male Telephone:	(00974) 4403 3854
Location:	Student Activities Building
Email:	`specialneeds@qu.edu.qa`

Academic Support and Learning Resources

The University Student Learning Support Center (SLSC) provides academic support services to male and female students at QU. The SLSC is a supportive environment where students can seek assistance with academic coursework, writing assignments, transitioning to college academic life, and other academic issues. SLSC programs include: Peer Tutoring, the Writing Lab, Writing Workshops, and Academic Success Workshops. Students may also seek confidential academic counseling from the professional staff at the Center.

Students Support and Learning Resources:	
Telephone:	(00974) 4403 3876
Fax:	(00974) 4403 3871
Location:	Female Student Activities Building
E-mail:	`learningcenter@qu.edu.qa`

Formal Complaints

Students at Qatar University have the right to pursue complaints related to faculty, staff, and other students. The nature of the complaints may be either academic or non-academic. For more information about the policy and processes related to this policy, you may refer to the students handbook.

Course Schedule

The following is the tentative schedule for the course and the topics covered:

Week	Date (Sunday)	Lecture Topic
1	Feb 12	Intro to ARM assembly and basic data processing instructions
2	Feb 19	Data Processing and Arithmetic Instructions
3	Feb 26	Bitwise operations
4	Mar 05	Control Flow Instructions
5	Mar 12	Memory Access instructions and Addressing Modes
6	Mar 19	Subroutines and Procedures
7	Mar 26	Exam 1
8	Apr 02	Exceptions and Interrupts
	Apr 09	Spring Break
9	Apr 16	Optimization of ARM Assembly Code
10	Apr 23	Optimized Primitives
11	Apr 30	Digital Signal Processing with ARM
12	May 07	Exam 2
13	May 14	ARM Organization and Implementation
14	May 21	ARM Hardware and Memory Interfacing
15	May 28	Review