**UTRGV logo**

**CSCI 4335.01:Computer Architecture**

**SYLLABUS**

**Fall 2023**

*Subject to any new Texas legislative mandate changes.*

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| **Course Information:**  **Meeting times:** Tuesdays and Thursdays 2:00 pm to 3:15pm  **Course Modality:** Traditional Face to Face  **Meeting location :** EIEAB 1.208 | |
| **Instructor Information:**  **Instructor Name: Dr. John P. Abraham**  Phone: (956) 665-3550 E-Mail: [john.abraham@utrgv.edu](mailto:john.abraham@utrgv.edu)  **Office location: EIEAB 3.243 (New Eng Bldg in Edinburg) Office hours:**TU: 12 noon 2 pm and Wed 10 am to 12:30 |

**My Schedule**

|  |  |  |  |
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| **CSCI 4335.01**  Computer Architecture [Syllabus.](file:///\\faculty.utrgv.edu\john.abraham$\4345\2022%20Fall\4335\2022\Syllabus%20FALL%2022.docx)  EIAB 1.208 | **TT 2:00 PM 3:15pm** |  |  |
| **CSCI 4345.01** [**Syllabus**](file:///\\faculty.utrgv.edu\john.abraham$\4345\2022%20Fall\4345\2022%20Fall\Syllabus%20Fall%202022.docx)  EIAB 2:209  Computer Networks | **TT 11:00 am to 12:15 pm Face to face** |  |  |
|  |  |  |  |
| **Office Hours** | TTh 12:30 PM TO 1:30 PM  Please make appointment at least two hours prior |  |  |
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**Welcome & Introduction to COURSE MODALITY**

**Traditional:** I will be teaching this course in person. Attendance is required. If you can’t come to classes please drop the course to avoid being dropped by the faculty.

Course Description, Prerequisites: A study of the operational units and their interconnections of a modern computer as well as the theory behind the design of the instruction set, control unit, registers, memory hierarchy and addressing modes, bus structures, input/output, and storage units. Similarities between CISC and RISC architectures and related issues such as instruction level parallelism and superscalar processors are discussed. Prerequisite: Grade of C or better in: [CSCI 2380 or CMPE 2380] and [CSCI 2333 or CMPE 2333 or ELEE 3435 or CMPE.

**ABET Learning Objectives/Outcomes for the Course**

* ABET (1) An ability to analyze a problem, and to identify and define the computing requirements appropriate to its solution.
* ABET (2) An ability to design, implement, and evaluate a computer-based solution to meet a given set of computing requirements in the context of the discipline.
* ABET (6) An ability to apply theory in the design and implementation of computer-based solutions.
* ABET (7) An ability to reason about and explain computer-based solutions at multiple levels of abstraction.

Face Covering [Protocol](https://www.utrgv.edu/coronavirus/updates/2020-05-29/index.htm) (optional)**:**

As part of the university’s ongoing COVID-19 mitigation efforts to maintain a healthy environment for all members of our campus community, anyone entering a campus building is encouraged wear a face covering that covers the mouth and nose. You are recommended to wear face coverings in all hallways, public spaces, research labs, teaching/computer labs, libraries, classrooms, automobiles with a passenger, stairwells, elevators and common areas, as well as office spaces.

**Textbooks:**

I used electronic version of the following textbooks to get my notes.  I strongly recommend you purchase these books:

Stallings, William, Computer Organization and Architecture, Designing for Performance, 10th Edition ISBN 978-0-13-410161-3. You may purchase the 11th edition as well.

Optional book:Hennessy, John L., and Patterson David A.  Computer Architecture A Quantitative Approach, 5th Edition. Elsevier. 2012 ISBN 978-0-12-383-872-8. I will be using this book to enhance certain topics. Please download the following simulators:

MARIE basic computer simulater:

Please download JAVA JDK, first and reboot your computer. I can’t find downloadable MARIE simulator any longer. So I will zip it and post it on my site, faculty.utrgv.edu/john.abraham

Instruction book for MARIE: https://marie.js.org/book.pdf

MIPS Assembler from this link: <http://courses.missouristate.edu/kenvollmar/mars/> We will be doing some MIPS programming.

**Recommended Reading:**

William Stallings, Computer Architecture

Irvine. Assembly Language for Intel-Based Computers

Nutt. Operating Systems, A Modern Perspective

**Course Topics:**

* History of computers
* Differentiate between architecture and organization
* Design an instruction set for an imaginary von Neumann machine including bits assigned to opcode and operand.
* Essential registers used by the system and users
* Memory hierarchy and related calculations
* processor instruction sets and architecture comparing RISC vs CISC
* Calculations involving processor performance and Amdahl’s law.
* Pipelined process and MIPS architecture and calculate performance improvement.
* Identify hazards related to pipelining.
* Microcode

**Course Structure:**

We will follow the Stallings textbook outline for our lectures drawing on Henessy and Patterson for Pipelined architecture. There will be approximately one lab assignment per week except for the first and last weeks and during midterm.

**Course Objectives:** Upon completion of this course students will be able to:

1. Identify and discuss major components of a microprocessor and explain how accumulator, stack, and general purpose registers work.
2. Design instruction set for an Accumulator based computer and create assembly language this instruction set. Using this assembly language write a simple assembly language program for adding two numbers.
3. Trace execution of the program you created in 1, and show contents of each of the registers.
4. Discuss memory hierarchy and do assigned calculations for cache memory.
5. Explain processor instruction sets and architecture comparing RISC vs CISC
6. Do calculations involving Amdahl’s law, particularly for MIPS architecture.
7. Given a set of assembly code, identify various hazards related to pipelining and supply possible solutions to overcome the hazards.
8. Differentiate between hardwired and software based microcodes.

**Course Assignments and Grading:**

There will be one midterm and one final examination.  These exams will constitute 70% of the grade. **If you must miss an exam, make prior arrangements. No make-up exams will be given unless you contact me in advance!** 25% of the grade will be for lab assignment (generally administered by my TA). **Homework will be submitted using Blackboard. Late homework will be levied heavy penalties.  Penalty: One day late 10%, 1 week late 20%, after 1 week but before 2 weeks late 50%.  After 2 weeks you will receive a 0 for the assignment.** Remaining 5% will be for attendance.   Letter grades will be based on the following grading scale A: 90-100% B: 80-89% C: 70-79% F: 0-69%

**Important Notice about taking exams:**

Your enrollment in this course requires that you use Respondus Lockdown Browser and Respondus Monitor for online assessment proctoring. LockDown Browser is a custom browser that locks down the testing environment within Blackboard and replaces regular browsers such as Chrome, Firefox, and Safari. Respondus Monitor requires you to have a webcam and microphone as it will record you while taking your assessment. **YOUR ACTIVITIES ARE RECORDED WHILE YOU ARE LOGGED INTO OR TAKING YOUR ASSESSMENT(S).  THE RECORDINGS SERVE AS A PROCTOR AND WILL BE REVIEWED AND USED IN AN EFFORT TO MAINTAIN ACADEMIC INTEGRITY.**You can find more detailed information on [Lockdown Browser and Monitor](https://www.utrgv.edu/online/getting-support/student-support/respondus/index.htm) at [UTRGV.edu/online](https://nam01.safelinks.protection.outlook.com/?url=https%3A%2F%2Fwww.utrgv.edu%2Fonline%2Fgetting-support%2Fstudent-support%2Frespondus%2Findex.htm&data=02%7C01%7Cpriscilla.lozano%40utrgv.edu%7C6e38d72002b74279921d08d7df9e3c2c%7C990436a687df491c91249afa91f88827%7C0%7C0%7C637223743015282674&sdata=lE6Dcm7gfPcp7rp86Xm5vTjmjTZ1CJCAxSfY6mJ7F7A%3D&reserved=0).

ATTENDANCE: Students are expected to attend all scheduled classes and may be dropped from the course for excessive absences. UTRGV’s attendance policy excuses students from attending class if they are participating in officially sponsored university activities, such as athletics; have been provided such an accommodation by Student Accessibility Services (SAS); for observance of religious holy days; or for military service. Students should contact the instructor in advance of the excused absence and arrange to make up missed work or examinations.

**Blackboard Support**

If you need assistance with course technology at any time, please contact the [Center for Online Learning and Teaching Technology](https://www.utrgv.edu/online/) (COLTT).

| **Campus:** | **Brownsville** | **Edinburg** |
| --- | --- | --- |
| **Location:** | Casa Bella (BCASA) 613 | Education Complex (EEDUC) 2.202 |
| **Phone:** | 956-882-6792 | 956-665-5327 |

**Toll Free: 1-866-654-4555**

Office Hours: Monday - Friday, 7:30 a.m. - 6:00 p.m.  
Support Tickets Submit a Support Case via our [Ask COLTT Portal](https://utrgv.edu/coltthelp)

**24/7 Blackboard Support**

Need Blackboard assistance after hours? You can call our main office numbers, 956-882-6792 or 956-665-5327, to speak with a support representative.

ACADEMIC INTEGRITY:

Members of the UTRGV community uphold the [Vaquero Honor Code](https://nam01.safelinks.protection.outlook.com/?url=https%3A%2F%2Fwww.utrgv.edu%2Fstudentlife%2Fabout%2Fvaquero-honor-code%2Findex.htm&data=02%7C01%7Cdavid.granado%40utrgv.edu%7C2b62b139d6dd4e81de4208d83567012f%7C990436a687df491c91249afa91f88827%7C0%7C0%7C637318063815870808&sdata=u3JK2q8UqFwgzYkzXZWeIRM%2FuNsVreezdMT5ZQr8tdE%3D&reserved=0)’s  shared values of honesty, integrity and mutual respect in our interactions and relationships.  In this regard, academic integrity is fundamental in our actions, as any act of dishonesty conflicts as much with academic achievement as with the values of honesty and integrity.  Violations of academic integrity include, but are not limited to: cheating, plagiarism (including self-plagiarism), and collusion; submission for credit of any work or materials that are attributable in whole or in part to another person; taking an examination for another person; any act designed to give unfair advantage to a student; or the attempt to commit such acts (Board of Regents Rules and Regulations, STU 02-100, and UTRGV Academic Integrity Guidelines).  **All violations of Academic Integrity will be reported to Student Rights and Responsibilities through**[**Vaqueros Report It**](https://nam01.safelinks.protection.outlook.com/?url=https%3A%2F%2Fwww.utrgv.edu%2Fen-us%2Fstudent-experience%2Freport-it%2F&data=02%7C01%7Cdavid.granado%40utrgv.edu%7C2b62b139d6dd4e81de4208d83567012f%7C990436a687df491c91249afa91f88827%7C0%7C0%7C637318063815880802&sdata=AxekhYtwdB%2Baey6EThon1hqp19tXWY7HmAdrWDFIELA%3D&reserved=0)**.**

STUDENTS WITH DISABILITIES:

Students with a documented disability (physical, psychological, learning, or other disability which affects academic performance) who would like to receive reasonable academic accommodations should contact **Student Accessibility Services (SAS)**for additional information.  In order for accommodation requests to be considered for approval, the student must apply using the *mySAS* portal located at [www.utrgv.edu/mySAS](https://nam01.safelinks.protection.outlook.com/?url=http%3A%2F%2Fwww.utrgv.edu%2FmySAS&data=02%7C01%7Cdavid.granado%40utrgv.edu%7C47dbf090677947b5e67e08d83305c9e4%7C990436a687df491c91249afa91f88827%7C0%7C0%7C637315447247309796&sdata=k%2FZq6WdNnZPfJN1x0egJQ9q0AMN%2Fd0pCtmNuRhnMy2g%3D&reserved=0) and is responsible for providing sufficient documentation of the disability to SAS. Students are required to participate in an interactive discussion, or an intake appointment, with SAS staff. Accommodations may be requested at any time but are not retroactive, meaning they are valid once approved by SAS. Please contact SAS early in the semester/module for guidance. Students who experience a broken bone, severe injury, or undergo surgery may also be eligible for temporary accommodations.

**Pregnancy, Pregnancy-related, and Parenting Accommodations**

Title IX of the Education Amendments of 1972 prohibits sex discrimination, which includes discrimination based on pregnancy, marital status, or parental status. Students seeking accommodations related to pregnancy, pregnancy-related condition, or parenting (reasonably immediate postpartum period) are encouraged to apply to **Student Accessibility Services** using the following link: [Pregnancy Accommodations Request Form](https://cm.maxient.com/reportingform.php?UnivofTexasRGV&layout_id=22) [https://www.utrgv.edu/pregnancy](https://nam01.safelinks.protection.outlook.com/?url=https%3A%2F%2Fwww.utrgv.edu%2Fpregnancy&data=02%7C01%7Cdavid.granado%40utrgv.edu%7C47dbf090677947b5e67e08d83305c9e4%7C990436a687df491c91249afa91f88827%7C0%7C0%7C637315447247309796&sdata=W%2BBV%2Bu2W%2FFo292T1PTZEqwcRWBp0bxcCT4YD1N07Mvg%3D&reserved=0)

**Student Accessibility Services:**

**Brownsville Campus**: Student Accessibility Services is located in 1.107 in the Music and Learning Center building (BMSLC) and can be contacted by phone at (956) 882-7374 or via email at [ability@utrgv.edu](mailto:ability@utrgv.edu).

**Edinburg Campus:** Student Accessibility Services is located in 108 University Center (EUCTR) and can be contacted by phone at (956) 665-7005 or via email at [ability@utrgv.edu](mailto:ability@utrgv.edu).

MANDATORY COURSE EVALUATION PERIOD**:**

Students are required to complete an ONLINE evaluation of this course, accessed through your UTRGV account ([http://my.utrgv.edu](http://my.utrgv.edu/)); you will be contacted through email with further instructions.  Students who complete their evaluations will have priority access to their grades.

SEXUAL MISCONDUCT and MANDATORY REPORTING:

In accordance with UT System regulations, your instructor is a “Responsible Employee” for reporting purposes under Title IX regulations and so must report to the Office of Institutional Equity & Diversity (OIED@utrgv.edu) any instance, occurring during a student’s time in college, of sexual misconduct, which includes sexual assault, stalking, dating violence, domestic violence, and sexual harassment, about which she/he becomes aware during this course through writing, discussion, or personal disclosure. More information can be found at [www.utrgv.edu/equity](https://nam01.safelinks.protection.outlook.com/?url=http%3A%2F%2Fwww.utrgv.edu%2Fequity&data=02%7C01%7Cdavid.granado%40utrgv.edu%7C3d4a82332e444b8e606d08d834d42073%7C990436a687df491c91249afa91f88827%7C0%7C0%7C637317432985425767&sdata=jCnOqfBL3vxfYuvYF3qtjVy4tmK9o9m%2FBghvXKfL%2FN4%3D&reserved=0), including confidential resources available on campus. The faculty and staff of UTRGV actively strive to provide a learning, working, and living environment that promotes personal integrity, civility, and mutual respect that is free from sexual misconduct, discrimination, and all forms of violence. If students, faculty, or staff would like confidential assistance, or have questions, they can contact OVAVP (Office for Victim Advocacy & Violence Prevention) at (956) 665-8287, (956) 882-8282, or [OVAVP@utrgv.edu](mailto:OVAVP@utrgv.edu).

COURSE DROPS:

According to UTRGV policy, students may drop any class without penalty earning a grade of DR (drop) until the official drop date. Following that date, students must be assigned a letter grade and can no longer drop the class. Students considering dropping the class should be aware of the “3-peat rule” and the “6-drop” rule so they can recognize how dropped classes may affect their academic success. The 6-drop rule refers to Texas law that dictates that undergraduate students may not drop more than six courses during their undergraduate career. Courses dropped at other Texas public higher education institutions will count toward the six-course drop limit. The 3-peat rule refers to additional fees charged to students who take the same class for the third time.

STUDENT SERVICES:

Students who demonstrate financial need have a variety of options when it comes to paying for college costs, such as scholarships, grants, loans and work-study. Students should visit the Student Services Center (U Central) for additional information. U Central is located in BMAIN 1.100 (Brownsville) or ESSBL 1.145 (Edinburg) or can be reached by email ([ucentral@utrgv.edu](mailto:ucentral@utrgv.edu)) or telephone: (888) 882-4026. In addition to financial aid, U Central can assist students with registration and admissions.

Students seeking academic help in their studies can use university resources in addition to an instructor’s office hours. University Resources include the Advising Center, Career Center, Counseling Center, Learning Center, and Writing Center. The centers provide services such as tutoring, writing help, counseling services, critical thinking, study skills, degree planning, and student employment. In addition, services such as the Food Pantry are also provided. Locations are listed below.

| **Center Name** | **Brownsville Campus** | **Edinburg Campus** |
| --- | --- | --- |
| **Advising Center**  [AcademicAdvising@utrgv.edu](mailto:AcademicAdvising@utrgv.edu) | BMAIN 1.400  (956) 665-7120 | ESWKH 101A  (956) 665-7120 |
| **Career Center**  [CareerCenter@utrgv.edu](mailto:CareerCenter@utrgv.edu) | BINAB 1.105  (956) 882-5627 | ESSBL 2.101  (956) 665-2243 |
| **Counseling Center**  [Counseling@utrgv.edu](mailto:Counseling@utrgv.edu)    [Counseling and Related Services List](https://www.utrgv.edu/facultysuccess/_files/documents/syllabus-statement-for-counseling-12-16-19.pdf) | BSTUN 2.10  (956) 882-3897 | EUCTR 109  (956) 665-2574 |
| **Food Pantry**  [FoodPantry@utrgv.edu](mailto:FoodPantry@utrgv.edu) | BCAVL 101 & 102  (956) 882-7126 | EUCTR 114 (956) 665-3663 |
| **Learning Center**  [LearningCenter@utrgv.edu](mailto:LearningCenter@utrgv.edu) | BMSLC 2.118  (956) 882-8208 | ELCTR 100  (956) 665-2585 |
| **Writing Center**  [WC@utrgv.edu](mailto:WC@utrgv.edu) | BUBLB 3.206  (956) 882-7065 | ESTAC 3.119  (956) 665-2538 |

**Calendar of Activities  - Please follow Blackboard deadlines.**

A screenshot of a computer

Description automatically generated