EGR 329 – Computer Architecture

FALL 2025 SYLLABUS 3 UNITS

Lectures: **Section A (Grissom):** TuTh 2:00pm – 3:30pm, TEGR 301
Section B (Moseley): TuTh 7:00am – 8:30am TEGR 301

Instructor Contact Information

	Section A	**Section B**
Instructor:	Dan Grissom, Professor	Robby Moseley, Asst. Professor
Office:	TEGR 331	TEGR 333
Office Hours:	TuTh 12:15-1:45pm, 3:30-4pm, or by appt. (see hours)	MWF 10am-12pm, 1-3pm
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Course Information

Course Description

Introduces students to the organization and architecture of computer systems, beginning with the standard von Neumann model and then moving forward to more recent architectural concepts. Introduction to assembly language programming.

Prerequisites

EGR 120/121 (Intro to Computer Programming in Python/C++) **AND** EGR 225 (Discrete Structures)

Course Objectives

By the end of this course, students should be able to demonstrate mastery of the following learning student/course outcomes; the Program Objectives being implemented by this course and the classroom assignments that the instructor will use to assess mastery are identified in the table:

EGR 329 Course Learning Objectives		
Description	**Objectives**	**Assignments**
Identify basic computer hierarchy and explain how the various layers of abstraction are translated from a high-level code language, down to an Instruction Set Architecture and digital logic.	1-Analysis	• HW/Projects • Projects • Exams
Identify and describe how the various components of the von Neumann architecture work together and form a processor datapath.	1-Analysis	• HW/Projects • Exams
Design computing sub-systems (memory, ALU, etc.) using digital logic and register level design.	2-Design	• HW/Projects • Exams
Demonstrate how digital logic is used to perform logical and mathematical operations.	1-Analysis	• HW/Projects • Exams
Explain the rationale behind memory/cache hierarchy in modern computing systems and evaluate memory/cache performance for various configurations.	1-Analysis	• HW/Projects • Exams
Write and run functional assembly language programs.	1-Analysis, 2-Design	• Projects
Describe the benefits and limitations of advanced architectural features such as pipelining, branch prediction and multi-processor designs.	1-Analysis	• Homework • Exams
Articulate the importance of design/organization/hierarchy with respect to faith.	7-World View	• Faith Integration

Program Objectives

The CBU College of Engineering (CoE) has the following outcomes that are assessed throughout the program in various courses:

CBU CoE Program Objectives			
#	**Source**	**Title**	**Description**
1	ABET	Analysis	Analyze a complex computing problem and to apply principles of computing and other relevant disciplines to identify solutions.
2	ABET	Design	Design, implement, and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program's discipline.
3	ABET	Communication	Communicate effectively in a variety of professional contexts.
4	ABET	Ethics	Recognize professional responsibilities and make informed judgments in computing practice based on legal and ethical principles.
5	ABET	Teamwork	Function effectively as a member or leader of a team engaged in activities appropriate to the program's discipline.
6	ABET	Applied Knowledge	Apply computer science theory and software development fundamentals to produce computing-based solutions.
7	CoE	Christian World View	Demonstrate an ability to articulate a Christian worldview on personal, professional, technical, and societal issues
8	CoE	Leadership	Demonstrate an understanding of the basic concepts in leadership

Required Textbook(s) & Software

Required Course Material

1.) [zyBook] Introduction to Computer Systems and Assembly Programming, a digital text book by zyBooks: https://www.zybooks.com/catalog/computer-systems-and-assembly-programming/

To signup for the zyBook, follow these instructions:

1) Sign in or create an account at learn.zybooks.com (Must use *calbaptist.edu* account)
2) Enter zyBook code **CALBAPTISTEGR329Fall2025**
3) Click *Subscribe*

The cost is to subscribe to this book is **$89.** The student subscription will be valid through **the end of the semester**.

NOTE: You CAN purchase a code from the book store if you want to use financial aid and not your personal credit card.

2.) [SOFTWARE]: Software platforms will be discussed by the instructor and students in class. Any required platforms will be free and easily downloadable or accessible via a browser.

Tentative Course Schedule*

~~NC~~ means "no class" due to university closure (e.g., holiday).

*** Schedule may change at discretion of instructor.**

Overview	Wk	Lec #	Date	Assignments Due	
				HW/Readings	Projects
Intro/Syllabus	1	1	Sep 2		
		2	Sep 4		
CH1: Information as Bits (High-Level Organization)	2	3	Sep 9	ZB1 (CH 1) - Info	**Project 1:** Quantum Computing (Emerging Archs)
		4	Sep 11		
CH1 : Information as Bits (Arithmetic)	3	5	Sep 16	ZB2 (CH 2) - MIPS	
		6	Sep 18	HW 1 (CH1) - Intro/Perf	
CH2: MIPS Assembly Part 1	4	7	Sep 23	ZB3 (CH 3) - MIPS	**Project 2:** MIPS Assembly
		8	Sep 25	HW 2 (CH 1) - Arith	
CH3: MIPS Assembly Part 2	5	9	Sep 30		
		10	Oct 2	HW 3 (CH2/3) - MIPS ISA	
Catchup/Review	6	11	Oct 7		
Midterm Exam		12	Oct 9		
CH5: MIPSzy Processor Design (Review Sections on Digital Logic)	7	13	Oct 14	ZB4 (CH 5 P1) - Dig Logic	
		14	Oct 16		
	8	15	Oct 21	ZB5 (CH 5 P2) - Proc; GL1 (CH5): V3, V4	
		16	Oct 23		
	9	17	Oct 28	GL2 (CH5): V1, V2, V3	**Project 3:** ALU from Digital Logic
		18	Oct 30	HW 4 (CH5) - Dig Logic	
CH5: MIPSzy Proc. Design (Processor & Datapath)	10	19	Nov 4	GL3 (CH5): V4, V5, V6	
		20	Nov 6		
	11	21	Nov 11	ZB6 (CH 6) - Mem	**Project 4:** Memory from Digital Logic
CH6: Memory Hierarchy		22	Nov 13	HW 5 (CH5) - Processor	
Review	12	23	Nov 18	HW 6 (CH6) - Mem/Cache	
		24	Nov 20		
Thanksgiving	-	~~NC~~	~~Nov 25~~		
		~~NC~~	~~Nov 27~~		
Final Exam (In Class)	13	25	Dec 2		
		-	Dec 4		

Assignment Overview

Preparation (zyBook Readings)

PHILOSOPHY: By spending time with engaging zyBook material before content is covered in class, students will be less likely to sit through lectures confused because of solid exposure to architecture concepts prior to lecture.

COLLABORATION: Students MUST work alone through zyBook participation activities. zyBooks offer sufficient hints for question sets and programming activities/challenges.

GENERAL: zyBook readings consist of and will be graded based on:

1. Participation activity completion
2. Challenge activity completion
3. Overall time spent with the content, relative to your peers

Several zyBook sections will be assigned prior to each week and/or lecture; please see online and refer to the specific assignments in zyBooks for exact due dates and required readings. The instructor will grade each week's zyBook section completion based on the due date, since the due date is typically put in place so you have read the material just before it is covered in class.

A 90% or above in zyBooks reading assignments will be graded as a 100% in Blackboard.

Preparation (Video Lectures)

PHILOSOPHY: Video lectures are supplied as graded assignments for select lectures in an attempt to "flip the classroom" when it would be more beneficial to have supervised time in class to work on projects and homework instead.

COLLABORATION: Students MUST watch and reflect on video lectures alone.

GENERAL: Video lectures will be graded based on the student's explanation of the content in the lecture. The grading is meant only to gauge if the student has actually spent adequate time watching the material and is not meant to test mastery of the material (i.e., it is okay to still not understand concepts or to have questions

Projects

PHILOSOPHY: Projects are the bread and butter of this course in which you will get to implement some key concepts in computer architecture (e.g., assembly language, memory, digital logic, standard cell design, etc.); it is essential that you do these projects to learn strong design methods in structured computer organization.

GENERAL: The first project is a research project on current trends in architecture. The second project is a set of assembly language programs which increase in difficulty and complexity. The last two projects are design projects which instill core architecture concepts in processor datapath and memory/cache design.

COLLABORATION: Projects can be worked on with a partner, but pairings must remain consistent for the entirety of the course to maintain continuity between partners. It is imperative that both partners are "pulling equal weight". It is not okay to do all the work and if you feel that you are doing too much work,

or that your partner is doing too little, please contact the instructor so we can handle it before too long so the situation can be resolved to improve the group's functionality.

Attendance

Attendance is required and expected for all lectures. To ensure students are attending lectures and being exposed to the core content of the course, attendance will be used as a modifier to your Participation scores (zyBook and Video Lectures**). The scores which you obtain on zyBooks and Video Lectures will be capped by your attendance percentage.** Preparation assignments represent a significant portion of your grade and account for **18% of your total grade**. As an example of this policy, if you received a 100% on all your Preparation assignments, that would typically earn you 18% toward your total grade; however, if you were absent 50% of the time, you'd only receive a maximum of 9% (out of the total possible 18%) toward your final grade.

Project Reports

PHILOSOPHY: In the technical field of Computer Science, it is extremely important to be able to convey your ideas and present your results in a way that is both clear and concise. If you have the best idea in the world, but you can't communicate it to anyone, your idea is useless. Thus, the project reports that accompany the programming projects are meant to sharpen your ability to extract meaningful conclusions from your results as well as to learn how to convey complicated ideas through **concise language, figures and tables**. It is important to note that this is not busy work and is not intended to be "lengthy".

GENERAL: Each project *may* require a report to be handed in. Individual project descriptions will contain more details about project report expectations.

COLLABORATION: Reports should be worked on with your project partner. If a programming project has an attached project report, **it is NOT acceptable to have one partner work on the project while one partner works on the report** and doing so will limit the learning potential of both partners.

Homework

PHILOSOPHY: Homework assignments are meant to fill in the gaps of material not intrinsically covered by projects and prepare you for material that will be on the exams.

GENERAL: There will be several written homework assignments. Homework assignments will generally be short and are **NOT** meant to take hours to complete.

COLLABORATION: High-level concepts of homework can be discussed together, but students should complete and turn in homework problems individually.

Exams

There will be two exams: a midterm and final (see schedule above). Time will be spent in class reviewing concepts before each exam and more details will be given on exam content in class. Both exams must be taken in order to pass the class. **No make-up exams will be given.**

Faith Integration

The faith integration portion of the course will be presented mid-semester.

Assessment Policies

Assignment Evaluation Plan

An assessment instrument (checklist, rubric, etc.) will accompany each major graded assignment. See the course website for specific assignment criteria and the accompanying grading instruments.

Late Penalty Summary

The following chart summarizes which gradable items can be accepted late and, if so, at what penalty:

Assignment Type	Late Policy
Projects, Homework, Faith Integration:	Due on the assigned due date at 11:59pm - 10% penalty 0-24hrs late - 20% penalty 24-48hrs late - 30% penalty 48-72hrs late - not accepted 72+hrs late (or accepted at instructor's discretion)
Preparation:	(zyBooks/Vids) Performed on own time according to instructor-provided schedule - not accepted late initially - 50% makeup at end of semester
Exams:	To be taken during class time - No makeups

Grading Scale

The following is a guide to the computation of your course grade; it is based on a 4.0 scale.

Grade	A	A-	B+	B	B-	C+	C	C-	D+	D	D-	F
Min % to Earn Letter	93%	90%	87%	83%	80%	77%	73%	70%	67%	63%	60%	0%
GPA (4.0 Scale)	4.0	3.7	3.3	3.0	2.7	2.3	2.0	1.7	1.3	1.0	0.7	0.0

Grading Criteria

Grade	Level	Description
A	Outstanding	Above and beyond the requirements of the assignment; outstanding effort, significant achievement, and personal improvement are clearly evident. Some measure of remarkable skill, creativity, or energy is also evident.
B	Above Average	Fulfills all aspects of the assignment and goes a bit beyond minimum competence to demonstrate extra effort, extra achievement, or extra improvement.
C	Average	Fulfills all aspects of the assignment with obvious competence. Assignments are completed exactly as assigned.
D	Below Average	Below average either because some aspect of the assignment has not been fulfilled or there are indications of a failure to follow directions, failure to follow specific recommendations, or failure to demonstrate personal effort and improvement.
F	Not Acceptable	Not acceptable, either because the assignment was not completed as directed or because the level of performance s below and acceptable level for college work.

Checking Grades

Be sure to check your grades often via Blackboard.

Grade Distribution

zyBooks Readings (6)	12%
Video Lectures (3)	6%
Homework (6)	18%
Project 1	7%
Project 2	7%
Project 3	10%
Project 4	10%
Midterm Exam (1)	12%
Final Exam (1)	15%
Ethical Perspectives (1)	3%
	100%

Course Policies

Communication via Discord

All course announcements will be made and all non-sensitive questions should be asked through the course category on the official CSDS Discord Server.
NOTE: Sensitive matters should be discussed via CBU e-mail (e.g., grading questions, classmate issues, etc.) due to FERPA.

Professionalism

As a professional, you are expected to collaborate with your colleagues during in-class activities or out-of-class group projects, and to respect one another with exemplary listening skills during all interactions, presentations, and class discussions. This also requires supporting your classmates with positive body language and appropriate verbal communication.

Netiquette

"Netiquette" can be described as a set of guidelines that govern the behavior of Internet users. These guidelines are a collection of best practices that promote professionalism, respect, safety and good digital citizenship.

A summary of Netiquette guidelines has been created based on published sources such as Virginia Shea's online book, Netiquette (2004). The summary can be accessed via the following Web link: https://bb1.cbuonline.edu/netiquette_rules_of_behavior_allyn_bacon.pdf

All students are expected to follow Netiquette guidelines when communicating electronically with classmates and instructors.

Academic Honesty

All violations of the Honor Code must be reported to the Student Services Office. **A first incident of violation of the Honor Code is handled at the discretion of the professor, in consultation with the Director of Student Conduct**. Judicial sanctions for an offense are handled on a case-by-case basis depending on the seriousness of the violation, prior violations, and other factors. Judicial sanctions may include, but are not limited to, loss of a letter grade, failure of the respective assignment/examination, or failure in the course in which the offense occurred, suspension, and/or expulsion from the University. A detailed discussion of academic dishonesty appears in the CBU Student Handbook.

Students with Disabilities

Students who have a documented disability and wish to arrange the appropriate accommodation must contact the Coordinator of Disability Services at DSS@calbaptist.edu.

Title IX Policy

California Baptist University is committed to providing a learning, working, and living environment that promotes personal integrity, civility, and mutual respect in an environment free of discrimination on the basis of sex, which includes all forms of sexual misconduct. For more information on CBU's Title IX policy, procedures, and resources, please refer to the Title IX page via the CBU website at https://calbaptist.edu/about/title-ix

Plagiarism

Plagiarism refers to representing work as your own without giving credit to the original author. Paraphrasing another person's work without citing the author is also plagiarism. For this course, turning in work that you completed for another work is unacceptable. All university policies pertaining to plagiarism will be enforced in this course. You can read those policies in the CBU Student Handbook. If you plagiarize in this course, you will receive an F on the given assignment, and you may receive an F in the course overall. All violations of the Honor Code must be reported to the Student Services Office.

Recording Class Sessions

Recording of class sessions without the prior express written permission of the instructor is prohibited. Any permission granted shall include the requirements that a recording may only be used for content study purposes only and sharing a recording with anyone outside of the course and/or posting on social media are strictly prohibited. This course policy is in alignment with Student Handbook and the Standard of Student Conduct. Refer to Student Handbook policies 15.6, 15.7, and 15.8 for more information.

Generative Artificial Intelligence (AI)

Generative AI (ChatGPT, Github Copilot, etc.) is a valuable set of tools within our industry and, as such, is something that students should become comfortable using in an ethical and responsible way. That said, there are certain scenarios and assignments that GenAI tools may or may not be allowed in this or any class. **The following table specifically lays out the GenAI policy for each assignment or assignment group in THIS CLASS ONLY**:

Assignment	GenAI Policy
zyBooks Readings (6)	GenAI chatbots (e.g., ChatGPT, Gemini, etc.) may be used to aid in understanding content, but should not be used to complete zyBooks participation or challenge problems (i.e., you should not copy/paste participation/challenge problem prompts directly into chatbots to receive answers).
Video Lectures (3)	GenAI chatbots may be used to aid in understanding content, but may not be used to "listen to videos" and generate automatic summaries of the content for students to submit as their own summary understandings or outlines; GenAI may NOT be used to "cleanup" student work (points will not be deducted for formatting/grammar for awkwardness).
Homework (6)	GenAI chatbots are discouraged, but not banned. The more you lean on chatbots to aid in your understanding of HW problems will likely result in poorer performance on exams.
Project 1	GenAI chatbots are permitted; however, all ideas and content being presented must be correct and properly sourced, as dictated by the project prompt. Content not properly sourced (no source, or links to sources that clearly do not support the claims of the presentation) will result in no credit for that content. In other words, make sure you research any content being supplied and follow the sources – do NOT assume the GenAI is providing truth or accurate sourcing.
Ethical Perspectives	GenAI chatbots (e.g., ChatGPT, Gemini, etc.) may be used to help ideate on your ideas. However, GenAI may NOT be used to "write any portion" or "complete" the assignment for you. In short, you can use it to help strengthen your ideas, but the expression of those ideas and writing you submit should all be your own. GenAI may NOT be used to "cleanup" student work (points will not be deducted for formatting/grammar or awkwardness).
Project 2	GenAI chatbots and GenAI code completion tools (e.g., GitHub Co-Pilot, Coding Agents) are NOT permitted.
Project 3 & Project 4	GenAI chatbots are NOT permitted in the creation of project code or documentation for this project (they are unlikely to be helpful, anyway); GenAI chatbots MAY be used to debug circuits (e.g., submitting screenshots along with a description of improper circuit behavior to see if the chatbot can help identify mis-wirings that are otherwise very hard to identify).
Midterm Exam & Final Exam	GenAI chatbots are not permitted (exams will be in-person with no access to technology other than a simple calculator).

NOTE: If you feel there would be an appropriate use of AI on an assignment that is not permitted by the above policy, please **ask the instructor in writing, BEFORE utilizing AI in a different way, so the instructor can consider changing the policy; **if the instructor decides to change the policy, a modification will be provided in writing to the entire class**. Utilizing AI outside of the bounds of the above limitations or any written modifications from the instructor (to the entire class) will be considered an academic integrity violation.*

When permitted (see table above), the use of generative AI should be treated the same as collaboration with another student and, as such, whenever generative AI is consulted there should be acknowledgement of that input listed in a prominent location at the top of the first page of your assignment or in the comments at the top of your code.

As we, as a society, grapple with the ethical use of Generative AI, it is best to ask if its use is appropriate until more formalized standards are in place. Also, it is important for students to understand several things about generative AI:

1. It is often incorrect, and this may or may not improve over time. The code/answers recommended by a generative AI tool should ALWAYS be checked against authoritative sources (just like anything that comes from an external source).
2. Any code submitted to a generative AI site becomes PUBLIC DOMAIN. Students should NEVER willingly paste anything (code, documents, etc.) that is proprietary and subject to copyright.

In general, students are responsible for the work they submit. All final submissions should be a student's own work with proper credit given to all collaborators (whether the source is humans or a generative AI).

Finally, while the instructor may permit and/or encourage Generative AI tools for some assignments, the instructor also holds the right to ban Generative AI tools for other assignments (see table above). Thus, it is imperative that, while Generative AI tools can be an amazing tool for learning, the student is still expected to be able to demonstrate proficiency in all course material WITHOUT the use of Generative AI.