

CISS 420 : Computer Architecture

Location:	Evening
Address:	1001 Rogers Street Columbia, MO 65216
Section:	20SPRG2/CISS/420/AEV
Semester Credit Hours:	3
Class Day(s) and Time(s):	Thursday 5:30 PM - 9:30 PM from March 08, 2021 to May 01, 2021

Syllabus Contents

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Course Information

Catalog Description

Introduces fundamental concepts of computer architecture including data representation, computer arithmetic, Boolean algebra, combinational logic design, sequential circuits, registers and counters, memory and programmable logic devices, instruction set architecture, CPU design, input-output, memory systems.

Prerequisite: CISS 360.

Additional Notes

It is a higher level class that requires lots of reading and attention to details. Please read the assigned reading for the week before the class so we can make the best usage of class time.

Quizzes and exams are provided by the book publisher and evaluate the comprehension understanding of the course concepts explained in the textbook.

Late policy: Assignments are due as stated in the syllabus. Late homework will be penalized by 10% of total points each day passing the due date, and will not be accepted 3 working days after the due date. If you have a justifiable schedule conflict for a scheduled event, e.g., a quiz, you need to communicate with the instructor ahead of time for arranging an alternative schedule.

Textbooks

As part of Truition®, students will receive their course materials automatically as described below.

 Stallings. (2019). *Computer Organization and Architecture* (11th). Pearson. eText

Bookstore Information

Visit <https://www.ccis.edu/bookstore.aspx> for details. Recommended texts are not included in the Truition®, No Book Costs, model. Students are responsible for purchasing their own recommended text if they desire to have it for class. Recommended eTexts are available for purchase directly from VitalSource.com.

eText Information

If a course uses an eText, (see textbook information above) the book will be available directly in Desire2Learn (D2L) seven days before the session begins, if registered for courses prior to that date. Upon first login to VitalSource, students should use their CougarMail email address; alternate email addresses cannot be used. More information about how to use the VitalSource platform, including offline access to eTexts, can be found in D2L.

Physical Course Materials Information

Students enrolled in courses that require physical materials will receive these materials automatically at the shipping address on file with Columbia College. Delivery date of physical materials is dependent on registration date and shipping location. Please refer to confirmation emails sent from Columbia College for more details on shipping status.

Returns: Students who drop a class are responsible for returning any physical course materials that were shipped. To initiate a return, visit [Ingram Returns](#) to generate a pre-paid return label. Materials from dropped courses must be returned within 30-days of receipt. **Failure to return physical items from a dropped course will result in a charge to the student account for all unreturned items.**

Note: Students who opt-out of having their books provided as part of Truition® are responsible for purchasing their own course materials.

Technology Requirements

THIS IS A TECHNOLOGY-ENRICHED COURSE WHICH COMBINES IN-SEAT INSTRUCTION WITH ONLINE LEARNING.

Participation in this course will require the basic technology for all classes at Columbia College:

- Computer with reliable internet access, broadband wired or wireless (3G or 4G/LTE)
- Speakers and a microphone – built-in or USB plug-in, wireless Bluetooth, or Smartphone
- A webcam or HD webcam – built-in, USB plug-in, or Smartphone
- A web browser, Google Chrome or Mozilla Firefox preferred
- Acrobat Reader
- Microsoft Office or another word processor such as Open Office

For more information, see [technical requirements](#).

Course Learning Outcomes

• Design combinational circuits using AND, OR, NOT, NAND, NOR, XOR, and XNOR gates, as well as tri-state gates. • Create combinatorial circuits using Karnaugh maps and Boolean algebra, including multiplexers, decoders, encoders, comparators and adders. • Create sequential circuits using flip-flops, counters, registers and memory. • Create complex sequential circuits using a finite state machine. • Create a microprocessor based upon a finite state machine. • Describe methods of communication between components of a computer system. • Describe methods of implementing memory systems, including virtual memory.

Course Objectives

• To conceptualize the underlying technology of modern electronic digital computers. • To utilize design methods to create combinatorial and sequential circuits. • To design a microprocessor. • To learn methods of implementing I/O. • To learn techniques and methods of implementing memory systems.

Grading

Grading Scale

Grade	Points	Percent
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A	900 - 1000	90-100%
B	800 - 899	80-89%
C	700 - 799	70-79%
D	600 - 699	60-69%
F	0 - 599	0-59%

Grade Weights

Assignment Category	Points	Percent
Discussion(8)	160	16%
In class activity(8)	160	16%
Dropbox assignments(6)	180	18%
Quiz(6)	180	18%
Research paper and Presentation	100	10%
Mid term and Final exam(2)	220	22%
Total	1000	100%

Schedule of Due Dates

Week 1

Assignment	Points	Due
Discussion 1	20	Original post due Thursday before class, two responses before midnight on Sunday
In class activity	20	Thursday in class
Reading chapter 1, 2, and 3 Before class on Thursday	--	Before class on Thursday
Quiz 1	30	Thursday in class
Dropbox Assignment	30	Sunday after the class

Week 2

Assignment	Points	Due
Discussion 2	20	Original post due Thursday before class, two responses before midnight on Sunday
In class activity	20	Thursday in class
Reading chapter 4,5, and 6	--	Before class on Thursday
Quiz 2	30	Thursday in class
Dropbox Assignment	30	Sunday after the class

Week 3

Assignment	Points	Due
Discussion 3	20	Original post due Thursday before class, two responses before midnight on Sunday
In class activity	20	Thursday in class
Reading - Chapter 7, 8, and 9	--	Before class on Thursday
Quiz 3	30	Thursday in class
Dropbox Assignment	30	Sunday after the class

Week 4

Assignment	Points	Due
Discussion 4	20	Original post due Thursday before class, two responses before midnight on Sunday

Assignment	Points	Due
In class activity	20	Thursday in class
Reading - Chapter 10, 11, and 12	--	Before class on Thursday
Mid term exam	110	Thursday in class
Week 5		
Assignment	Points	Due
Discussion 5	20	Original post due Thursday before class, two responses before midnight on Sunday
In class activity	20	Thursday in class
Reading - Chapter 13 and 14	--	Before class on Thursday
Quiz 4	30	Thursday in class
Dropbox Assignment	30	Sunday after the class
Week 6		
Assignment	Points	Due
Discussion 6	20	Original post due Thursday before class, two responses before midnight on Sunday
In class activity	20	Thursday in class
Reading - Chapter 15 and 16	--	Before class on Thursday
Quiz 5	30	Thursday in class
Research paper and Presentation	100	Thursday in class
Dropbox Assignment	30	Sunday after the class
Week 7		
Assignment	Points	Due
Discussion 7	20	Original post due Thursday before class, two responses before midnight on Sunday
In class activity	20	Thursday in class
Reading - Chapter 17, 18, and 19	--	Before class on Thursday
Quiz 6	30	Thursday in class
Dropbox Assignment	30	Sunday after the class
Week 8		
Assignment	Points	Due
Discussion 8	20	Original post due Thursday before class, two responses before midnight on Sunday
In class activity	20	Thursday in class
Reading - Chapter 20 and 21	--	Before class on Thursday
Final Exam	110	Thursday in class
Total Points: 1000		

Assignment Overview

Assignments

Reading: Each week, you will have various readings from our textbook for the course. Make sure to complete the readings prior to attempting any assignments. If you are struggling to understand the topics, utilize the Open Forum in the Discussions area to post what you are confused about. This will give your classmates the opportunity to test their understanding, while at the same time assisting you. Your instructor will monitor this discussion forum as well. All readings should be completed prior to attempting assignments each week and prior to class.

Discussions: Each week, you will participate in one online discussion to deepen your understanding of course topics. Discussions are worth 20 points each. You must read the chapters for the week prior to posting. Your initial posts should answer all discussion questions thoroughly. In addition, at least two responses post to a classmate is required per discussion. Your initial posts should be written in your own words. Writing is expected to be at a college-level with correct grammar and punctuation, containing at least one full paragraph and a minimum word count of 50 words or more, excluding quoted material. Your responses to others' posts should also be well developed and specific, fully explaining your response to the classmates' posts. Write responses that add to the conversation and take it further; general posts such as "I agree." or "Wow, great post!" do not help develop ideas. You should be specific and add to the conversation. A detailed grading rubric is available below. Initial posts are due by 11:59 pm C.T. on Thursday of each week. Responses are due by 11:59 pm C.T. on Sunday of each week, except Week 8 which is due by 11:59 pm C.T. on Saturday, the last day of the course.

Please follow the rubric and ensure to elaborate on the topic. These discussions are to increase the understanding on the topic.

Dropbox assignments: You will complete six hands-on weekly assignments demonstrating your understanding of different concepts. Assignments are worth 30 points each. You should use the course Dropbox to submit all assignments.

Class Activity: Students will explain one topic from that week's reading to the class. Can take between 3-15 minutes. Sometimes we may look at each others code or assignment to help each other as well.

Research paper and Presentation

Important

Plagiarism detection will be used for your Final Presentation - Research Paper assignment. Research papers are to be your own work, which can be influenced by references. Cut and paste activity will show up on the Originality Report – if you leverage content you have submitted as part of another class, your paper will show a higher score in this report (high scores are bad). PLEASE SUBMIT AN ORIGINAL PAPER FOR THIS ASSIGNMENT, do not re-use a paper that you have submitted for another course. A high percentage on the Originality Report will affect your grade.

Format and Length

All undergraduate papers are to be 10 pages, double spaced. The title page and bibliography are not included in this 10 page requirement. Maintain reasonable space between paragraphs and pay particular attention to the spacing around figures that you include. The use of graphical items should be limited. Font size is limited to 12 and the margins are 1 inch all around. You must use a style process such as MLA.

Double Important

There is an old saying in business, "If you have to swallow a frog, don't look at it too long." Which means get this paper done right away. All Research Papers are due as listed in the course. Late papers are not accepted under any circumstances. These papers are due week 6 but you can turn them in any time by posting them in the dropbox. On the first day of class you know when this assignment is due. Budget your time well so that you are not betting on your life being normal in six weeks. We all know things happen that we cannot foresee. Think of it this way, the sooner you get this done the more time you will have to prepare for you final exam. We can discuss the questions in the class on Thursday.

Examinations

Quizzes and Exams: There will be 6 quizzes in this course covering the assigned weekly readings. There are going to be two exams. Quizzes are worth 30 points each. Quizzes and exams will evaluate the understanding of the class reading for the week and will be done during the class. So please study in advance.

Course Outline

Click on each week to view details about the activities scheduled for that week.

Week 1:

Discussion 1

Consider a hypothetical microprocessor generating a 16-bit address (for example, assume that the program counter and the address registers are 16 bits wide) and having a 16-bit data bus. What is the maximum memory address space that the processor can access directly if it is connected to a "16-bit memory"? What is the maximum memory address space that the processor can access directly if it is connected to an "8-bit memory"? What architectural features will allow this microprocessor to access a separate "I/O space"? If an input and an output instruction can specify an 8-bit I/O port number, how many 8-bit I/O ports can the microprocessor support? How many 16-bit I/O ports? Explain.

In class activity**Reading chapter 1, 2, and 3 Before class on Thursday****Quiz 1****Dropbox Assignment****Week 2:****Discussion 2**

What is the difference between DRAM and SRAM in terms of application?

What is the difference between DRAM and SRAM in terms of characteristics such as speed, size, and cost?

In class activity**Reading chapter 4,5, and 6****Quiz 2****Dropbox Assignment****Week 3:****Discussion 3**

A distinction is made between physical records and logical records. A logical record is a collection of related data elements treated as a conceptual unit, independent of how or where the information is stored. A physical record is a contiguous area of storage space that is defined by the characteristics of the storage device and operating system. Assume a disk system in which each physical record contains thirty 120-byte logical records. Calculate how much disk space (in sectors, tracks, and surfaces) will be required to store 300,000 logical records if the disk is fixed-sector with 512 bytes/sector, with 96 sectors/track, 110 tracks per surface, and 8 usable surfaces. Ignore any file header record(s) and track indexes, and assume that records cannot span two sectors.

Explain one thing you learn from this week's reading.

In class activity**Reading - Chapter 7, 8, and 9****Quiz 3****Dropbox Assignment****Week 4:****Discussion 4**

Explain any three Programmable Logic Devices concepts.

In class activity**Reading - Chapter 10, 11, and 12****Mid term exam****Week 5:****Discussion 5**

Explain an overview of essential characteristics of machine instructions and Describe the types of operands used in typical machine instruction sets.

In class activity**Reading - Chapter 13 and 14****Quiz 4****Dropbox Assignment****Week 6:**

Discussion 6

Explain the principle behind instruction pipelining and how it works in practice. Compare and contrast the various forms of pipeline hazards.

In class activity

Reading - Chapter 15 and 16

Quiz 5

Research paper and Presentation

Important

Plagiarism detection will be used for your Final Presentation - Research Paper assignment. Research papers are to be your own work, which can be influenced by references. Cut and paste activity will show up on the Originality Report – if you leverage content you have submitted as part of another class, your paper will show a higher score in this report (high scores are bad). PLEASE SUBMIT AN ORIGINAL PAPER FOR THIS ASSIGNMENT, do not re-use a paper that you have submitted for another course. A high percentage on the Originality Report will affect your grade.

Format and Length

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Double Important

There is an old saying in business, “If you have to swallow a frog, don’t look at it too long.” Which means get this paper done right away. All Research Papers are due as listed in the course. Late papers are not accepted under any circumstances. These papers are due week 6 but you can turn them in any time by posting them in the dropbox. On the first day of class you know when this assignment is due. Budget your time well so that you are not betting on your life being normal in six weeks. We all know things happen that we cannot foresee. Think of it this way, the sooner you get this done the more time you will have to prepare for your final exam. We can discuss the questions in the class on Thursday.

Dropbox Assignment

Week 7:

Discussion 7

Briefly explain what is meant by a hardwired implementation of a control unit. What is the difference between a hardwired implementation and a microprogrammed implementation of a control unit?

In class activity

Reading - Chapter 17, 18, and 19

Quiz 6

Dropbox Assignment

Week 8:

Discussion 8

Summarize the differences among simple instruction pipelining, superscalar, and simultaneous multithreading.

In class activity

Reading - Chapter 20 and 21

Final Exam

+ Additional Resources

Online databases are available at library.ccis.edu. You may access them using your CougarTrack login and password when prompted.

Technical Support

If you have problems accessing the course or posting your assignments, contact your instructor, the Columbia College Technology Solutions Center, or the D2L Helpdesk for assistance. If you have technical problems with the VitalSource eText reader, please contact VitalSource. Contact information is also available within the online course environment.

- Columbia College Technology Solutions Center: CCHelpDesk@ccis.edu, 800-231-2391 ex. 4357
- D2L Helpdesk: helpdesk@d2l.com, 877-325-7778
- VitalSource: support@vitalsource.com, 1-855-200-4146

Online Tutoring

Smarthinking is a free online tutoring service available to all Columbia College students. Smarthinking provides real-time online tutoring and homework help for Math, English, and Writing. Smarthinking also provides access to live tutorials in writing and math, as well as a full range of study resources, including writing manuals, sample problems, and study skills manuals. You can access the service from wherever you have a connection to the Internet. I encourage you to take advantage of this free service provided by the college.

Access Smarthinking through CougarTrack at [Students -> Academics -> Resources](#).

! Columbia College Policies and Procedures

The policies set forth in the [Policy Library](#) are the current official versions of College policies and supersede and replace any other existing or conflicting policies covering the same subject matter. For more information on policies applicable to students, see [Student Policies](#). For more information on policies applicable to the entire Columbia College community, see [College-Wide Policies](#).

Students are expected to read and abide by the College policies. Policies of particular interest to students include, but not limited to the following:

- Graduate Grading Policy
- Undergraduate Grading Policy
- Registration Policy and Procedures
- Withdrawal Policy
- Alcohol and Other Drugs Policy
- Family Educational Rights and Privacy Act (FERPA)

Additional Policies:

Academic Integrity and Plagiarism

Academic integrity is a cumulative process that begins with the first college learning opportunity. Students are responsible for knowing and abiding by the [Academic Integrity Policy and Procedures](#) and may not use ignorance of either as an excuse for academic misconduct. Additionally, all required papers may be submitted for textual similarity review to Turnitin.com for the detection of plagiarism. All submitted papers may be included in the Turnitin.com reference database for the purpose of detecting plagiarism. This service is subject to the Terms and Conditions of Use posted on the Turnitin.com site.

Disability Resources

If you have a disability that requires an accommodation, please speak with the instructor and consult the [Student Accessibility Resources](#) office. Student Accessibility Resources staff will determine appropriate accommodations and will work with your instructor to make sure these are available to you. To find additional information, see our [ADA and Section 504 Policy for Students](#).

Notice of Non-Discrimination and Equal Opportunity:

The College has a process through which students, faculty, staff and community members who have experienced or witnessed incidents of discrimination, harassment, or retaliation on the basis of protected status, can report their experiences to a College official. For more information, see our [Non-Discrimination and Equal Opportunity Policy and Complaint Resolution Procedure](#).

Title IX and Sexual Harassment

The College is committed to addressing the issues of discrimination and sexual harassment in the educational and workplace landscape and will continue to modify policies, procedures and prevention efforts as needed. For more information, see the College's [Title IX and Sexual Harassment Policy](#).

Course Policies and Procedures:

Attendance Policy

Students are required to attend courses and instructors are required to record attendance. Students can view their attendance records in Self-Service and are responsible for assuring accuracy. It is the students' responsibility to contact their instructor should they find any discrepancy. Non-attendance may negatively impact a student financially.

Students are directly responsible to instructors for class attendance and work missed during an absence for any cause. If absences jeopardize progress in a course, the College reserves the right to drop or withdraw students from classes. For additional information, see the Administrative Withdrawal for Non-Attendance heading in the [Withdrawal Policy](#).

For purposes of this policy, attendance at the College in web-enhanced and hybrid courses includes:

1. Attending a class in-person or virtually where there is an opportunity for direct interaction between the instructor and students (must be present and visible for the entire class with your video camera turned on when attending virtually);
2. Submitting an academic assignment;
3. Taking or submitting an exam;
4. A posting by a student showing the student's participation in an online study group that is assigned by the College or attending a study group that is assigned by the College;
5. Participating in or posting by a student in a discussion forum showing the student's participation in an online discussion about an academic matter;

For purposes of this policy, attendance at the College in in-seat and virtual courses is:

1. Attending a class in-person or virtually where there is an opportunity for direct interaction between the instructor and students (must be present and visible for the entire class with your video camera turned on when attending virtually).

CougarMail

All students are provided a CougarMail account when they enroll in classes at Columbia College. You are responsible for monitoring email from that account for important messages from the College and from your instructor.

Students should use email for private messages to the instructor and other students. The class discussions are for public messages so the class members can each see what others have to say about any given topic and respond.

Late Assignment Policy

All classes rely on participation and a commitment to your instructor and your classmates to regularly engage in the reading, discussion and writing assignments. You must keep up with the schedule of reading and writing to successfully complete the class.

No late assignments will be accepted without the prior approval of the instructor.

Acceptance of a late assignment is at the discretion of the instructor.

Make-up examinations may be authorized for students who miss regularly-scheduled examinations due to circumstances beyond their control. Make-up examinations must be administered as soon as possible after the regularly scheduled examination period and must be administered in a controlled environment.

Student Conduct

All Columbia College students, whether enrolled in a land-based or online course, are responsible for behaving in a manner consistent with Columbia College's [Student Conduct Code](#) and [Acceptable Computing Use Policy](#). Students violating these policies or any other College policy will be referred to the office of Student Affairs and/or the office of Academic Affairs for possible disciplinary action. The Student Code of Conduct, the [Student Behavioral Misconduct Policy and Procedures](#), and the Acceptable Computing Use Policy can be found in the Policy Library at ccis.edu/policies. The adjunct faculty member maintains the right to manage a positive learning environment all students must adhere to the conventions of online etiquette when enrolled in a course with an online component.