Instructor Contact Information:
Name: Dr. Tim Nix
Office: STEM 312C
Phone: (936) 468-1619
E-mail: timothy.nix@sfasu.edu
Office Hours: Mon 10:00AM – 11:00AM
2:30PM – 3:30PM
Tue 10:00AM – 11:00PM
2:30PM – 3:30PM
Wed 10:00AM – 11:00AM
2:30PM – 3:30PM
Thu 10:00AM – 11:00AM
2:30PM – 3:30PM
Other times by appointment

Lecture Schedule:
TueThu 11:00AM – 12:15PM STEM 314

Course Purpose: The purpose of this course is to: (1) provide the student with a solid foundation in system level organization and architecture concepts using the operating system’s application programmer’s interface, kernel mechanisms, and data structures; and (2) expose the student to system hardware component relationships and interactions with the system kernel via the C language programming. Upon completion of this course, students should have a complete understanding of the role played by each major component of a modern computer system.

Course Description: CSC2314 is a course about the architectural structure and organization of computers; analysis of the processor components, memory structure, I/O section, and bus; and the study of system component interrelationships and interactions with the system kernel and selected programming techniques.

Prerequisite: CSC 2302: Computer Science Principles (C or better).


Suggested Items: USB Flash Memory Drive (64 MB minimum)
Course Objectives:
1. Elaborate the basic principles of computer architecture and organization, and identify the factors that influence the performance of the system.
2. Properly use the following C language features and facilities: indirection (pointers), data storage, selection structures, bit operations, and interrupt facilities.
3. Describe some modern architectures such as RISC, Superscalar, VLIW (very large instruction word).
4. Describe the operation of performance enhancements such as pipelines, dynamic scheduling, branch prediction, and caches.
5. Describe the principles of computer system design.
6. Explore operating system kernel interactions with the memory, I/O, peripherals, and bus system components.
7. Demonstrate an understanding of the standard models of computers including the instruction fetch cycle and the physical components involved in this process; memory, CPU, I/O.
8. Demonstrate skills in problem analysis and program design.

Topics:
- Bits, Data Types, and Operations .................................................. 3
  a. Bits and the concept of a data type, type conversions
  b. Logical and arithmetic operations
  c. Integer and floating-point data types, ASCII codes
- Digital Logic Structures ............................................................... 3
  a. Boolean algebra and DeMorgan’s Law
  b. CPU design: registers, and combinatorial logic structures
  c. Memory design; address space and addressability
- Computer structures, function, interconnection ......................... 9
  a. Processor and register organization, bus, clock
  b. Instruction pipelining
  c. Memory organization and addressing
  d. Bus interconnection structures
- Input and Output in Interfacing and Communications .............. 3
  a. I/O architectures, Programmed and Interrupt-driven I/O
  b. Direct memory access
  c. I/O channels and processes
- Machine Issues and Concepts ................................................. 6
  a. Instruction Set Architecture: instruction organizations
  b. Memory addressing
  c. CPU structures and operations
- Memory Systems Organization .............................................. 3
  a. Semiconductor memory design and operation
  b. Cache memory
  c. Memory hierarchy
- RISC and Multiprocessor Architectures.................................... 6
  a. Parallel and multiprocessor architectures
  b. RISC, CISC, VLIW, current
- High-level Language Utilization of Hardware Components .......... 9
  a. C data types and variables, global and local scope
  b. Tables and space allocation for resources
  c. Control stack organization and allocation
  d. Expressions and statements; arithmetic and logical operators
  e. Control structures, data structures, and pointers
  f. Functions and parameter passing
- Exams (3 plus Final)............................................................ 5

Grading Policy:

<table>
<thead>
<tr>
<th>Graded Programming Assignments</th>
<th>25%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Graded Homework Assignments</td>
<td>25%</td>
</tr>
<tr>
<td>Exams</td>
<td>25%</td>
</tr>
<tr>
<td>Final Exam – Comprehensive</td>
<td>25%</td>
</tr>
<tr>
<td><strong>Total:</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

Grading Rubric:

<table>
<thead>
<tr>
<th>Letter Grade</th>
<th>Assigned Score (s)</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>90 % ≤ s</td>
<td>Mastery</td>
</tr>
<tr>
<td>B</td>
<td>80 % ≤ s &lt; 90 %</td>
<td>Good Understanding</td>
</tr>
<tr>
<td>C</td>
<td>70 % ≤ s &lt; 80 %</td>
<td>Adequate</td>
</tr>
<tr>
<td>D</td>
<td>65 % ≤ s &lt; 70 %</td>
<td>Probably Failed to Demonstrate</td>
</tr>
<tr>
<td>F</td>
<td>s &lt; 65 %</td>
<td>Definitely Failed to Demonstrate</td>
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**Course Calendar:**
This course meets for a minimum of 37.5 lecture contact hours during the semester, including the final exam. Students have significant weekly reading assignments. Students are expected to complete homework assignments, programming assignments, and 3 periodic exams in addition to the final exam. Students are expected to prepare for any class assignments or quizzes over the material covered in class or in the reading material. Successful completion of these activities requires at a minimum six additional hours of outside of classroom work each week.

**Tentative Topic Schedule:**

<table>
<thead>
<tr>
<th>Week</th>
<th>Topic</th>
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<tbody>
<tr>
<td>Aug 24 – Aug 28</td>
<td>Course Introduction and Linux</td>
</tr>
<tr>
<td>Aug 31 – Sep 04</td>
<td>Binary Representations of Numbers</td>
</tr>
<tr>
<td>Sep 07 – Sep 11</td>
<td>Character Codes and Error Detection/Correction</td>
</tr>
<tr>
<td>Sep 14 – Sep 18</td>
<td>Exam I / Review</td>
</tr>
<tr>
<td>Sep 21 – Sep 25</td>
<td>Boolean Algebra and Logic Gates</td>
</tr>
<tr>
<td>Sep 28 – Oct 02</td>
<td>Digital Components and Circuits</td>
</tr>
<tr>
<td>Oct 05 – Oct 09</td>
<td>Computer Organization Basics</td>
</tr>
<tr>
<td>Oct 12 – Oct 16</td>
<td>Instruction Set Architectures</td>
</tr>
<tr>
<td>Oct 19 – Oct 23</td>
<td>Exam II / Review</td>
</tr>
<tr>
<td>Oct 26 – Oct 30</td>
<td>Computer Memory</td>
</tr>
<tr>
<td>Nov 02 – Nov 06</td>
<td>I/O Architectures</td>
</tr>
<tr>
<td>Nov 09 – Nov 13</td>
<td>System Software</td>
</tr>
<tr>
<td>Nov 16 – Nov 20</td>
<td>Exam III / Review</td>
</tr>
<tr>
<td>Nov 23 – Nov 27</td>
<td>Thanksgiving Break</td>
</tr>
<tr>
<td>Nov 30 – Dec 04</td>
<td>Parallel and RISC Architectures</td>
</tr>
<tr>
<td>Dec 07 – Dec 11</td>
<td>Final Exams</td>
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</tbody>
</table>

**Email:** The course requires that you have and use your SFA Jacks email account. You are responsible for messages sent by course instructors and other SFA officials to your SFA Jacks email address. Due to FERPA restrictions, any email correspondence regarding this course must be sent to me from your SFA Jacks email account only; due to this, emails sent to me from an address other than your official SFA email address will not receive a response. You are responsible for checking your email daily.

**D2L:** The course has a D2L site that can be found at d2l.sfasu.edu. You may also use this email. You are responsible for all announcements and materials presented on this web page, and should check it daily. If you do not have access to our class page in D2L, you must contact me. Also, contact the Center for Teaching and Learning Tech Support, Phone: 936.468.1919 or email: d2l@sfasu.edu; their hours are Monday - Friday, 8 a.m. - 5 p.m. CST.
**Attendance:** Classroom attendance for live lectures is not required. All lectures will be livestreamed via Zoom (https://sfasu.zoom.us/). You are expected to attend either face-to-face or via the livestream. For either, you are expected to be present, properly dressed, and awake during the entire class period unless you have been given permission to leave early.

All graded events can be completed remotely; however, lecture attendance, tests and quizzes require live participation. Students at increased risk of severe illness from COVID-19 are encouraged to take the course remotely.

**Classroom attendance:** There will be no smoking, no chewing of tobacco, no eating or drinking, no bare feet, and no cell phone use during class. Cell phones and other electronic communication devices must be turned off during class. Please do not walk across the front of the room after the class has started. Students entering the classroom after the lecture has started should take a seat in the back of the room.

**Livestream attendance:** You need to have your camera enabled and be in an environment that is conducive to learning and not distracting (including an environment that is not distracting to your fellow classmates). Make sure to have your computer set up to be able to follow along with the class activity. Feel free to keep your microphone muted, just remember to unmute when you need to ask a question. Inappropriate or disruptive student behavior, offensive language, or unprofessional conduct will not be tolerated. Please see the D2L Livestream Lecture Content Page for Zoom meeting ID and password.

**Social Distancing and classroom constraints:** Due to social distancing constraints, the classroom size is limited to 11 students. Students desiring to attend face-to-face lectures may be required to attend the livestream once per week instead.

**Mask Policy:** Masks (cloth face coverings) must be worn over the nose and mouth at all times within the classroom and appropriate physical distancing must be observed. Students not wearing a mask and/or not observing appropriate physical distancing will be asked to leave the class. All incidents of not wearing a mask and/or not observing appropriate physical distancing will be reported to the Office of Student Rights and Responsibilities. Students who are reported for multiple infractions of not wearing a mask and/or not observing appropriate physical distancing may be subject to disciplinary actions.


**Examinations:** There will be three regular exams during the semester and a final exam. All exams are comprehensive. The three regular exams will be given during the scheduled lecture period. Exams must be taken during the specified time period on the date scheduled. No
makeup exams will be given. The final exam will be taken in accordance with the final exam schedule and is worth 25% of the final grade. There are no exemptions from the final examination and no changes in taking the final examination. Check the final exam time. If the final exam time is a problem, you need to drop this course. All exams can be taken remotely. An Internet connection is required.

**Tentative Exam Dates:**

<table>
<thead>
<tr>
<th>Date</th>
<th>Day</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>09/15/2020</td>
<td>Tuesday</td>
<td>Exam 1</td>
</tr>
<tr>
<td>10/20/2020</td>
<td>Tuesday</td>
<td>Exam 2</td>
</tr>
<tr>
<td>11/17/2020</td>
<td>Tuesday</td>
<td>Exam 3</td>
</tr>
<tr>
<td>12/10/2020</td>
<td>Thursday</td>
<td>Final Exam</td>
</tr>
</tbody>
</table>

**Graded Assignments:** There will be 5-7 programming assignments. Programming assignments will be worth 25% of the total grade. There will also be 7-10 graded homework assignments that focus on definitions and concepts. Homework assignments will also be worth 25% of the total grade.

**Policy Regarding Help on Graded Assignments:** All graded assignments are restricted to individual effort, and you may not receive help from another student. Any resource used, other than the instructor or the course text, must be explicitly documented in your submission detailing the source and describing what was learned and how that information was used. You may receive help from the AARC, but you must clearly document what help was received. Submissions will be severely penalized if:

- copied in part or in whole from any source;
- the result of excessive help from any other individual; or
- documentation is missing, inadequate, or vague.

**Late Submissions:** All homework assignments are due no later than the time and date specified in the assignment. Assignments will not be accepted after the specified date and time.

**Office Hours:** The Zoom Office Hours are hosted with a waiting room and you will be muted. This accommodates privacy just as it is in person. I will admit you as soon as I can.

All SFA students have a pro Zoom account. When signing into Zoom, do not log into Zoom with Google or Facebook accounts, as this will result in them creating extra Zoom accounts that you do not need and will not have all the pro features. To authenticate and log into a Zoom meeting, follow the steps provided here: [How to join a Zoom meeting](#). Please see the D2L Office Hours Content Page for Zoom meeting ID and password.

**Expectations of Students:**

- **Be prepared for lectures and take notes.** I expect you to have read the assigned readings. Class time is primarily for extending and applying what you learn from the readings. If you come unprepared, you will get significantly less out of class and quickly fall behind. Be an active note-taker.
• **Attend the lectures and be on time.** There will be times when you will want to skip class. Make your education a priority. During the lectures, I will reinforce material from the textbook and cover things that are not in the textbook. You will still be responsible for this material. Missing a lecture should be a rare occurrence. If you do miss the lecture, get the notes from another student. See me during my office hours for clarification of any missed material.

• **Take ownership of your learning.** You are solely responsible for how much you get out of this course. It is not my responsibility to spoon-feed you knowledge, but rather to guide you along your developmental path. I hope that this course will challenge you. Deep learning happens when you struggle and succeed. During lectures, your participation and undivided attention are critical. On the assignments, leaning too much on looking at someone else’s code robs you of learning and tricks you into thinking you understand more that you do.

• **Seek my help early if you feel lost.** If you are doing the readings, attending the lectures and taking copious notes, and yet you still feel lost, do not convince yourself that things will get better on their own or that you will catch up this weekend. This course, like most others, builds on itself throughout the semester. Come see me before the feelings of confusion compound.

**Student Behavior:** SFA Policy manual states the classroom behavior should not interfere with the instructor's ability to conduct the class or the ability of other students to learn from the instructional program. Unacceptable or disruptive behavior will not be tolerated. Students who disrupt the learning environment may be asked to leave class and may be subject to judicial, academic or other penalties. This prohibition applies to all instructional forums, including electronic, classroom, labs, discussion groups, field trips, etc. The instructor shall have full discretion over what behavior is appropriate/inappropriate in the classroom. Students who do not attend class regularly or who perform poorly on class projects/exams may be referred to the iCare Early Alert Program. This program provides students with recommendations for resources or other assistance that is available to help SFA students succeed.

**Program Learning Outcomes:** Program learning outcomes define the knowledge, skills, and abilities students are expected to demonstrate upon completion of an academic program. These learning outcomes are regularly assessed to determine student learning and to evaluate overall program effectiveness.

• Students majoring in the Department of Computer Science may access program learning outcomes at [http://www.sfasu.edu/academics/colleges/sciences-math/computer-science/about/accreditations](http://www.sfasu.edu/academics/colleges/sciences-math/computer-science/about/accreditations).

**CLASS INFORMATION AND POLICIES**
Department of Computer Science, STEM 312, 468-2508

**Attendance:** Roll will be taken regularly. Attendance may be taken into consideration for your final grade. If you attend the lectures, you are expected to be present and awake the entire class period unless you have been given permission to leave early. If you are absent from class, please make sure to get notes from a classmate. In the classroom, there will be no smoking, no
chewing of tobacco, no eating or drinking, no bare feet, and no cell phone use. Cell phones and other electronic communication devices must be turned off during class. Possession of a cell phone or other electronic communication device during an exam will result in an examination grade of zero. No disruptive behavior including offensive language will be tolerated in a computer science facility or related activity. Such behavior may result in administrative removal from class. Only students officially registered for the course and approved assistants may attend class. Please do not disrupt the classroom if you arrive late. Students entering the classroom after the lecture has started should take a seat in the back of the room.

**Examination Policy:** All class examinations are considered to be a major part of the course work upon which a large part of the course grade depends. There are NO make-up exams! Class examinations will be announced at least two classes prior to the examination. If you have a conflict with another university event, you must contact me well in advance of the examination. In case of an extreme emergency, contact me before the scheduled examination. Failure to do so may result in an examination grade of zero. There are no exemptions for the final examination and no changes in taking the final examination. **All students must take the final exam. A zero on the final exam will result in an F in the course.** Check the final examination time. If the final examination time is a problem, you need to drop this course.

**Assignment Policy:** All assignments are due at the announced time on the specified due date. Assignments will not be accepted late. If you have a conflict, please contact me in advance. You should turn in your homework assignments done neatly, clearly, and to the best of your ability. Follow all the instructions given. You will lose points for failure to follow instructions. Any work turned in to my box should be dated and timed by the CSC department staff. Please ask nicely. **DO NOT** slide any work under my office door or under the door to the Computer Science offices. **PLEASE NOTE:** You may be given assignments during the last five class days of the semester.

**Software Policy:** Disciplinary action will be taken against individuals who perform unauthorized duplication of software or who are involved in the unauthorized use of duplicated software. Such action may make it impossible for you to successfully complete this course.

**Computer Laboratory Usage:** Students utilizing equipment in university computing laboratories are expected to read and abide by all posted policies for the laboratories. Please note that no children and no pets are permitted in university computing laboratories.

**Drop Policy (Univ.):** The official university add/drop policy is located at: [https://www.sfasu.edu/policies/course-add-drop_6.10.pdf](https://www.sfasu.edu/policies/course-add-drop_6.10.pdf). If you have questions concerning registration, add/drop or the withdraw process, contact the Registrar at (936) 468-2501 or E-mail: registrar@sfasu.edu. The Registrar is located on the 2nd floor of the Rusk building.

**Special Accommodation Requests:** To obtain disability related accommodations, alternate formats and/or auxiliary aids, students with disabilities must contact the Office of Disability Services (ODS), Human Services Building, and Room 325, 468-3004 / 468-1004 (TDD) as early as possible in the semester. Once verified, ODS will notify the course instructor and outline the accommodation and/or auxiliary aids to be provided. Failure to request services in a timely manner may delay your accommodations. For additional information, go to [http://www.sfasu.edu/disabilityservices/](http://www.sfasu.edu/disabilityservices/). Students with special accommodation requests have the responsibility to immediately initiate a meeting with the instructor to discuss how the special accommodations will be provided. Students who are aware of these special needs at the
beginning of the semester must inform the instructor in person before the twelfth class day about any class activity, which will require special accommodations.

**Computer Account Policy:** All assignments that require the use of the University Computer must be done under the computer account that is assigned to you in this class. You should NOT do other class assignments in this account, and you should NOT do assignments from this class in other accounts. Failure to abide by the above statements will mean that you will received a grade of F in this course.

**Academic Integrity:** Academic integrity is a responsibility of all university faculty and students. Faculty members promote academic integrity in multiple ways including instruction on the components of academic honesty, as well as abiding by university policy on penalties for cheating and plagiarism.

Academic dishonesty includes both cheating and plagiarism. Cheating includes but is not limited to (1) using or attempting to use unauthorized materials to aid in achieving a better grade on a component of a class; (2) the falsification or invention of any information, including citations, on an assigned exercise; and/or (3) helping or attempting to help another in an act of cheating or plagiarism. Plagiarism is presenting the words or ideas of another person as if they were your own.

Examples of plagiarism are (1) submitting an assignment as if it were one’s own work when, in fact, it is at least partly the work of another; (2) submitting a work that has been purchased or otherwise obtained from an Internet source or another source; and (3) incorporating the words or ideas of an author into one’s paper without giving the author due credit. All instances of academic dishonesty will be reported to Office of the Dean of the student’s major. This report shall be made part of the student’s record and shall remain on file with the Dean’s office for at least four years. Instances of academic dishonesty may also be reported to the University Committee on Academic Integrity. A student who wishes to appeal decisions related to academic integrity follows procedures outlined in University policy A-9.1. Please read the complete policy at [https://www.sfasu.edu/policies/4.1-student-academic-dishonesty.pdf](https://www.sfasu.edu/policies/4.1-student-academic-dishonesty.pdf).

If in my judgment an instance of academic dishonesty on an examination has occurred, a grade of zero will be assigned as the examination grade and a minimum of one (1) letter grade will be lost in the course grade. Possession of a cell phone or other electronic communication device during an exam will result in an examination grade of zero. A course grade of F may be assigned depending on the situation. A student found cheating on an examination may not drop the course. If in my judgment a student is found cheating on any part of a homework assignment or quiz, the student will receive negative points equal to the value of the entire homework/quiz. A negative grade will not be replaced by any possible bonus assignment. I consider the person who did the work (homework, quiz, or test) and the person copying the work as both cheating. A recurrence of this by any individual will result in a grade of F in the course. **DO YOUR OWN WORK!!!!!! Do NOT show your code to other students!!**

**Withheld Grades Semester Grades Policy (A-54):** Ordinarily, at the discretion of the instructor of record and with the approval of the academic chair/director, a grade of WH will be assigned only if the student cannot complete the course work because of unavoidable circumstances. Students must complete the work within one calendar year from the end of the semester in which they receive a WH, or the grade automatically becomes an F. If students register for the same course in future terms the WH will automatically become an F and will be counted as a repeated course for the purpose of computing the grade point average.
**Acceptable Student Behavior:** Classroom behavior should not interfere with the instructor's ability to conduct the class or the ability of other students to learn from the instructional program (see the Student Conduct Code, policy D-34.1). Unacceptable or disruptive behavior will not be tolerated. Students who disrupt the learning environment may be asked to leave class and may be subject to judicial, academic, or other penalties. This prohibition applies to all instructional forums, including electronic, classroom, labs, discussion groups, field trips, etc. The instructor shall have full discretion over what behavior is appropriate/inappropriate in the classroom. Students who do not attend class regularly or who perform poorly on class projects/exams may be referred to the Early Alert Program. This program provides students with recommendations for resources or other assistance that is available to help SFA students succeed.

**Identification:** Valid student I.D. cards must be presented on each examination day. (No I.D...No exam...Grade of zero