Course Description:

To understand the operating system is to understand the workings of the entire computer system, because it is the operating system that manages each and every piece of hardware and software. In this course we will learn what operating systems are, how they work, what they do, and why. This includes, but is not limited to: memory management; processor management; process management; device management; file management; network concepts; and various different operating systems.

Specific topic coverage includes:
- Introducing Operating Systems
- Memory Management: Early Systems and Virtual Memory
- Processor Management
- Process Management (there is a difference between the two)
- Concurrent Processes
- Device Management
- File Management
- Network Organization Concepts and Network Operating Systems
- Security and Ethics
- System Management
- Comparison of at least two or three different operating systems (UNIX, Windows, Android, and/or Linux)
- Installing and using the Ubuntu Linux Operating System on VirtualBox (VB)

Professor: Frank H. Katz
Days/Time: Tuesdays - Thursdays, 4:30 – 5:45
Classroom: SC 2506
Office/Phone: SC 210/344-3192
E-mail: My current e-mail address is frank.katz@armstrong.edu, but sometime after the start of the semester, this will become fkatz@georgiasouthern.edu

Contacting me via e-mail: although I have provided my ASU e-mail address above, in order to centralize/store/consolidate e-mails, I prefer that students use the e-mail function incorporated in Desire-2-Learn (D2L) as the primary method of e-mail communication. Assignments are to be submitted via D2L assignment drop boxes, but in the event that an assignment must be e-mailed to me, it MUST be e-mailed as an attachment to a D2L e-mail. I will NOT grade assignments sent to my regular e-mail address.

Scheduled Office Hours: My posted office hours are: MW 11: 00 am-noon; TTh 1 pm to 3:30pm; F 10 am to noon. I am also available by appointment
Prerequisite: CSCI 1150
IMPORTANT DATES

<table>
<thead>
<tr>
<th>Date</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monday, January 8</td>
<td>Armstrong’s first day of classes</td>
</tr>
<tr>
<td>Tuesday, January 9</td>
<td>OUR first day of class</td>
</tr>
<tr>
<td>Monday, January 15</td>
<td>MLK Jr. Holiday, ASU closed</td>
</tr>
<tr>
<td><strong>Wednesday, February 28</strong></td>
<td>Mid-term, last day to withdraw without a WF; if you withdraw after this date, the Registrar will automatically assign a WF</td>
</tr>
<tr>
<td>Monday March 12 – Friday March 16</td>
<td>Spring Break</td>
</tr>
<tr>
<td>Thursday, April 26</td>
<td>Last day of OUR class; Friday, April 27 is the last day of class for the university</td>
</tr>
<tr>
<td>Thursday, May 3, 2 – 4pm</td>
<td>Final Exam</td>
</tr>
</tbody>
</table>

**Grading:**

The course will be graded based on a total of 1000 total points available:

<table>
<thead>
<tr>
<th>ITEM</th>
<th>Nbr</th>
<th>Value Each</th>
<th>Tot Pct</th>
<th>Value out of 1000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assignments</td>
<td>Seven</td>
<td>7% or 70 pts</td>
<td>49%</td>
<td>490 of 1000</td>
</tr>
<tr>
<td>“Pop” Quizzes</td>
<td>Six, lowest is dropped (5)</td>
<td>3% or 30 pts</td>
<td>15%</td>
<td>150 of 1000</td>
</tr>
<tr>
<td>Ubuntu Linux Labs</td>
<td>Multiple, all total</td>
<td>10% or 100 pts</td>
<td>10%</td>
<td>100 of 1000</td>
</tr>
<tr>
<td>Mid-Term Exam</td>
<td></td>
<td>12% or 120 pts</td>
<td>12%</td>
<td>120 of 1000</td>
</tr>
<tr>
<td>Final Exam</td>
<td></td>
<td>This test is somewhat comprehensive.</td>
<td>14% or 140 pts</td>
<td>14%</td>
</tr>
</tbody>
</table>

**Software Requirements, Materials and Resources:**

- You will need access to the MS Office Suite, **Office 2013, or 2016**. Most of your work will be done in **MS Word**, it is unlikely that you will need any other components of the suite. While I have opened documents created using Open Office in the past, it is a bit cumbersome, and some formatting is usually lost, so I prefer that you use MS Office, and specifically, MS Word.
  - Please note that when we do work in Ubuntu Linux on VirtualBox, this OS has its own word processing software (not Word). **Only assignments from this OS are allowed to be submitted via Word processing software other than Word.**
- It isn’t likely that you will need to “zip” any documents, but if you do, I will only accept files zipped using the **Microsoft Compression utility provided in Windows**, or the third-party utility **7Zip**. I cannot be expected to possess every possible zip utility available.
- A **USB flash memory thumb drive** (a drive as small as 1GB will suffice).
- Access to the virtualization software **VirtualBox** (it is installed in our labs in SC 129 and SC 1503A). **You will need to install the 64 bit version** on your own computer. Instructions on how to download and install this software, as well as Ubuntu Linux, to be run on VB, will be provided. You will also be provided the instructions on how to get VB to work with 64 bit guest OSs (this may not be as easy as it seems), such as Windows 10.
Homework assignments will be submitted using Desire-2-Learn Assignment Drop boxes. You will be provided information about how to use the system, your username, and password. Materials needed for the course will be provided in Desire-2-Learn. As stated above, communications from me to the class will be conducted via e-mail or discussion postings within Desire-2-Learn.

**Course Outcomes:**

Upon successful completion of this course, you will be able to describe and/or define:

1. The basic role of an operating system; the major operating system software subsystem managers and their functions.
2. The basic functionality of the fixed partitions, dynamic partitions, and relocatable dynamic partitions memory allocation schemes.
3. The basic functionality of the paged, demand paging, segmented, and segmented/demand paged memory allocation schemes, and the differences between these different policies (or algorithms).
4. The differences between job scheduling and process scheduling; the different preemptive and non-preemptive process scheduling algorithms.
5. The causes of system deadlock and livelock; the differences between preventing and avoiding deadlocks; how to detect and recover from deadlocks.
6. The critical difference between processes and processors; basic concepts of multi-core processor technology.
7. How processors cooperate when executing a job, process, or thread; the significance of a critical region in process synchronization software.
8. Features of dedicated, shared, and virtual devices
9. Roles of seek time, search time, and transfer time in calculating access time
10. The fundamentals of file management and the structure of the file management systems; file-naming conventions; the difference between fixed-length and variable-length record formats; the advantages and disadvantages of contiguous, noncontiguous, and indexed file storage techniques.
11. Several different network topologies, including the star, ring, bus, tree, and hybrid; the difference between circuit-switching and packet switching, and examples of everyday use that favor each; conflict-resolution procedures.
12. The complexities introduced to operating systems by network capabilities; the differences between Network Operating Systems and Distributed Operating Systems.
13. The role of the operating system with regard to system security; the effects of system security practices on overall system performance.
14. The comparison of various different operating systems to each other.
15. The ability to use virtualization software (VirtualBox) to install and use Ubuntu Linux, including: adding and removing software to an Ubuntu installation; connecting to the Internet in an Ubuntu installation; and using the Ubuntu Linux console to perform command line driven data and file manipulation.

**Individual Homework Policies:**

- All assignments are due on the date indicated in the specific assignment in D2L. Each dropbox shall have a **due date** and an **end date**. Late submissions are allowed, and will be made to the same dropbox as those made on time. If your submission is late, even by seconds, the system will mark it as late. Students will be given a **two day “grace period”** (i.e., end date
will be two days after the due date). Assignments submitted within the following time frames will be assessed the following penalties:

- Within 12 hours of the due date: 5% deduction
- From 12:01 hours after the due date until 24 hours after the due date: 10% deduction.
- More than 24 hours but less than 48 hours after the due date: 15% deduction.
- **These penalties are non-negotiable. Ignorance of the due date/time and end/late date/times are NO excuse.**

- Unless you have a note from your doctor, your employer, or an extreme personal reason (e.g. death in the family, extreme illness, business trips), assignments will **not** be accepted after our class’ last day of the semester, which is Thursday, April 26, at 11:59 pm.

- Assignments will **NOT** be accepted in any other method other than described above. They MUST be submitted to the appropriate D2L dropbox.
  - Under **NO** circumstances will submissions e-mailed to my regular e-mail address be accepted.
  - In the event you have a legitimate excuse for turning in an assignment after the end date (see bullet point above for such excuses), it MUST e-mailed to my D2L inbox.

- Homework assignment questions are to be answered in **black text** (NO other color is permissible). **Red is not** to be used, as it is reserved for me to grade your work. **Answers submitted in a color other than black will not be graded.** In addition, you do not need to specify your answer by prefacing it with “Answer” (or any other indication, such as “Ans”). When reading your work, I can easily tell what your answer is without it being explicitly stated.

- If the question only requires one answer, there is no reason to use bullet points. If you are going to use bullet points, use MS Word’s bullet point function, **don’t create your own by placing a – or an * in front of your text.** In addition, try to avoid using auto-numbering in your answers.

- I will ensure that assignments are not due on D2L system maintenance dates, which are listed below and run from 10pm on Friday night to 7am the following morning. The D2L maintenance dates can be found here: [http://www.usg.edu/information_technology_services/learning_in_21st_century_georgia/georgiaview/maintenance_schedule/](http://www.usg.edu/information_technology_services/learning_in_21st_century_georgia/georgiaview/maintenance_schedule/)

- **Grammar and spelling requirements:**
  - Answers to questions on assignments are expected to meet strict spelling and grammatical requirements.
  - Other than obvious typographic errors, any answer to any question containing more than one such error (e.g. the same repeated mistake) will be assessed a one point deduction.
Pop Quizzes

- In order to encourage attendance, six short closed-book pop quizzes will be given during the semester. *The lowest grade shall be dropped, so only five shall be counted.*
- *No excuse will be accepted for a missed pop quiz.* If you aren’t present, you will not be allowed a make-up.
- *If the quiz is given at the beginning of class and you are not present, you will not be allowed a make-up.* If the quiz is given at the end of class, and you leave early, you will not be allowed a make-up.

Test Policies

- Your tests will consist of a combination of multiple choice/T-F questions. They will be graded via Scan-Tron sheets. You will have various extra credit questions, which will require you to write short answers or solve problems, some of which might be mathematical.
- **Mid-Term Exam:** You will need to notify me in advance if you cannot be present for this test. Failure to do so, without a medical excuse or extreme emergency that can be documented, will result in a late assessment of a 15% deduction on the test. Make-ups of this exam, with or without the deduction of 15%, will only be given within one week of the original test. No make-up will be given more than one week after the original date of a test – in this case, the test will be scored as a zero.
- **Final exam policy:**
  - The Final Exam is *mandatory.* While it will predominantly contain material covered since the mid-term exam, approximately 5 to 10% of the questions will come from important material covered before the mid-term exam.
  - Failure to show up for the exam at the appointed date and time without a legitimate reason made known to me in advance will result in a zero for the exam. The final exam will not be given after the test date, so if you have a valid reason why you cannot take it on the test date, you must notify me in advance to have it specially scheduled.
- **Use of “helping” materials on tests:** the use of any “helping materials” on tests, such as note cards, etc., is at the discretion of the professor and will be announced prior to the test. If such material is allowed, you will be provided with a standardized method to use on the test. No other material will be allowed.

Extra Credit

- Extra Credit assignments and/or quizzes are a privilege, not a right. Such assignments/quizzes may be given at the discretion of the professor.
- In order to be fair to all students, such assignments/quizzes will only be offered to the entire class. *Individual extra credit assignments/quizzes will not be given.*
- Under no circumstances will any such assignments/quizzes be given after the university’s last day of class, Friday, April 27. This includes after final grades have been posted online in Desire-2-Learn and subsequently to SHIP. At that point, all grades are final, and no additional assignments/quizzes will be given to adjust any final course grades.
- **15 points overall extra credit** will be available to all students who have submitted proof of submission of their Smart Eval of me and the course. Proof does not mean your answers to the survey questions, which are to remain private and anonymous. Proof means a screenshot of the submission completion notice you receive when you have completed the Smart Eval.
Submission (screenshot attached to a D2L e-mail) MUST be made by 5pm on Friday, April 27. No submissions will be accepted after that date and time.

- ALL assignments are REQUIRED unless explicitly designated as EXTRA CREDIT.

Class Policies on Electronic Devices

- To avoid disruptions of both lab work/lectures and classroom lectures and discussions, you are to turn off all electronic devices, including cell/smart phones, beepers, and any MP3 players or iPods while in the lab or classroom.
- Laptops will ONLY be allowed if you are taking notes. Periodic checks will be made by me to determine that you are using them for their intended purpose. Any student found using a laptop for a purpose unrelated to class will be instructed to turn it off.

Changes to Syllabus

- The professor reserves the right to change the class schedule, including assignments, labs, and tests, only if prior notice is given to the class.
- Changes due to natural disasters, in the event classes have been canceled by the university and/or an evacuation has been ordered by the Chatham Emergency Management Agency (CEMA). I have the right to:
  o Cancel assignments or tests
  o Revise due dates for assignments not canceled; revise the date of tests
  o Revise components of assignments or tests
  o Revise the value of assignments or tests
  o Revise the overall value of the course (e.g. the course will now be worth 940 instead of 1000 points)
  o Such changes will be broadcast to you via D2L e-mail. If classes are canceled and/or an evacuation is ordered, you are responsible for, as best as possible, keeping up with university BLAST updates and changes issued by me via D2L e-mail. Changes to the course will only be issued from me to you by D2L e-mail and D2L announcements.

Plagiarism and Cheating

- Violations of the Georgia Southern University Academic Integrity Policy (including cheating and plagiarism) are taken very seriously. Any violation of this policy will become part of the student’s permanent educational record. More information on the Academic Integrity policy and procedure can be found at www.armstrong.edu/studentintegrity.
- In this class, the textbook homework assignments, lab exercises (unless otherwise specified), and exams must be your own work. Work on the group project may be collaborative, but, as will be pointed out in the project guidelines, an individual grade will be given, and thus it is presumed that the student whose name is on a particular deliverable/document is the student who did the work.
- STUDENTS ARE PROHIBITED FROM USING COPYRIGHTED, PLAGIARIZED MATERIAL SUCH AS INSTRUCTOR MANUALS/SOLUTIONS OBTAINED EITHER ONLINE OR FROM ANOTHER STUDENT. ANY WORK FOUND TO HAVE BEEN SUBMITTED IN VIOLATION OF THIS POLICY SHALL RECEIVE A ZERO, AND THE
POSSIBILITY THAT THE STUDENT(S) INVOLVED MAY BE TURNED IN TO THE ASU HONOR COURT.

- Submitting a corrupted file, i.e., a file that cannot be opened by me, for an assignment, will result in a zero for that assignment. Be sure that you do NOT submit a shortcut to a file, i.e., that you submit the file itself. Be sure that the file you submit will indeed open before submitting it. Students will NOT be given extra time to complete an assignment if I cannot open it.

Title IX

Georgia Southern is dedicated to providing a safe and equitable learning environment for all students. Discrimination, sexual assault, and harassment are not tolerated by the university. You are encouraged to report any incidents to the Title IX Office in Victor Hall Room 245 or by email diversity@armstrong.edu. This is important for the safety of the whole Armstrong community. Another member of the university community – such as a friend, classmate, advisor, or faculty member – can help initiate the report, or can initiate the report on behalf of another person. The University Counseling Center provides 24/7 confidential support, and the https://www.armstrong.edu/health-safety/counseling-center describes reporting options and other resources.

Disability Related Accommodations

Georgia Southern University is committed to providing reasonable accommodations to students with documented disabilities, as required under federal law. Disabilities may include learning disabilities, ADD, psychological disorders, brain injury, Autism Spectrum Disorders, serious chronic medical illnesses, mobility impairment, communication disorders, vision or hearing loss or temporary injuries. The purpose of disability accommodation is to provide equal access to the academic material and equal access to demonstrate mastery of the material. Students with disabilities must meet all the academic requirements and standards of the class, including the attendance policy. If you have a disability and need accommodations, please contact the Office of Disability Services, located on the second floor of Memorial College Center, room 208. You will need to meet with Disability Services Staff, who can help you gather documentation of your disability or refer you to an appropriate resource for assessment. Once documentation of the disability is gathered and approved, Disability Staff will provide you with an Accommodation Letter, detailing the appropriate, approved accommodations, which you should present to me so we can discuss and implement your accommodations. Disability accommodations work best starting at the beginning of the semester, but can be approved and started at any point in the semester. Accommodations start at the time the Accommodation Letter is presented to faculty, within reasonable timelines. Accommodations are not given retroactively. Accommodations are not part of your academic transcript.
### Detailed Semester Schedule

<table>
<thead>
<tr>
<th>Week</th>
<th>Days (T - Th)</th>
<th>Topics</th>
<th>Unit / Chapters</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Jan 9 - 11</td>
<td>Introducing Operating Systems</td>
<td>1 / 1</td>
<td>HW1 assigned</td>
</tr>
<tr>
<td>2</td>
<td>Jan 16 - 18</td>
<td>Memory Management: Early Systems</td>
<td>2 / 2</td>
<td>HW2 assigned; HW1 due</td>
</tr>
<tr>
<td>3</td>
<td>Jan 23 - 25</td>
<td>Memory Management: Virtual Systems</td>
<td>2 / 3</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Jan 30 – Feb 1</td>
<td>Processor Management</td>
<td>3 / 4</td>
<td>HW3 assigned; HW2 due</td>
</tr>
<tr>
<td>5</td>
<td>Feb 6 – 8</td>
<td>Process Management</td>
<td>4 / 5</td>
<td>HW4 assigned; HW3 due</td>
</tr>
<tr>
<td>6</td>
<td>Feb 13 – 15</td>
<td>Process Management (deadlocks)</td>
<td>4 / 5</td>
<td>HW4 due</td>
</tr>
<tr>
<td>7</td>
<td>Feb 20 - 22</td>
<td>Concurrent Processes</td>
<td>4 / 6</td>
<td>Thurs: Mid-Term Exam, covers Chs 1-6</td>
</tr>
<tr>
<td>8</td>
<td>Feb 27 – Mar 1</td>
<td>Device Management</td>
<td>5 / 7</td>
<td>Wed, 2/28, last day to withdraw without a WF; HW5 assigned</td>
</tr>
<tr>
<td>9</td>
<td>Mar 6 - 8</td>
<td>File Management</td>
<td>5 / 8</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Mar 20 – 22</td>
<td>Network Organization Concepts</td>
<td>6 / 9</td>
<td>HW6 assigned; HW5 due</td>
</tr>
<tr>
<td>12</td>
<td>Apr 3 – 5</td>
<td>Security and Ethics</td>
<td>7 / 11</td>
<td>HW7 assigned; HW6 due</td>
</tr>
<tr>
<td>13</td>
<td>Apr 10 – 12</td>
<td>System Management; Installing &amp; using Ubuntu Linux</td>
<td>7 / 12</td>
<td>HW7 due; Ubuntu Linux labs assigned</td>
</tr>
<tr>
<td>14</td>
<td>Apr 17 – 19</td>
<td>Comparative Operating Systems; using Ubuntu Linux</td>
<td>From 8 / 13 - 16</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Apr 24 – 26</td>
<td>Comparative Operating Systems</td>
<td></td>
<td>Ubuntu Linux labs are due</td>
</tr>
<tr>
<td></td>
<td>May 3, 2pm – 4pm</td>
<td>Final Exam</td>
<td></td>
<td>Is somewhat comprehensive</td>
</tr>
</tbody>
</table>

**Spring Break, March 12 - 16**