

## Course Syllabus

Course: **CSIS 429 - Operating Systems**

Term: **Fall 2020**

**Days & Time:** Online

**Classroom:** Online – no meeting times.

**Professor:** Dr. Anthony Varghese

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**Office:** South Hall 127C

**Email:** [anthony.varghese@uwrf.edu](mailto:anthony.varghese@uwrf.edu)

To get a hold of me, I recommend the InBox in Canvas (<https://go.uwrf.edu/learn>) rather than email. I get notifications and check it regularly outside of the above office hours. I try to respond as soon as possible during “business hours” of 9am-5pm. If I am in meetings, it may take me a few hours to get a response back, so please plan accordingly.

**Office hours:** MW: 10am-12pm and 1-2 pm; W: 2-4 pm using Microsoft Teams.

### Prerequisites:

CSIS 248 – Operating System Programming

CSIS 355 - Computer Organization & Assembly Language

Understanding of the UWRF Canvas course management system.

**Credits:** 3

### Textbooks

1. Advanced Programming in UNIX, 3<sup>rd</sup> ed, R. Stevens.
2. Computer Organization and Architecture by Null & Lobur.
3. Operating Systems: Three Easy Pieces by R Arpaci-Dusseau (online)  
Lab materials will be on Canvas.

**Software:** Microsoft Word or LibreOffice, VirtualBox, Linux virtual machine.

**Online Materials:** Lecture notes and labs are available on Canvas

**Mode of Instruction:** Online

### Course Description

This course is an introduction to the principles of designing Operating Systems. Students will gain an understanding of processes, synchronization and deadlocks, memory management, and file systems.

### Course Learning Objectives

By the end of this course, students will be able to understand:

1. the techniques of virtualizing a CPU in operating systems
2. the principles of memory virtualization
3. synchronization techniques used in concurrent processes and threads
4. the design and implementation of persistent storage and file systems

**Course Calendar:** A detailed course calendar is provided in Canvas.

### Expectations

- Participation: Your participation is crucial to your success in any class and especially so in an online class like this. Watch the videos in the week they are scheduled. You may be disadvantaged by delaying even a single one – it is your responsibility to get caught up. Check for announcements and updates at least once a day on the Canvas site for the course.

- Preparation: You are expected to read the lab document fully and to do the lab activities on your own. You will be assigned to a team of 4-5 students and you are expected to contribute equally to the work in class and in preparing the lab reports.
- Workload outside class hours: In general, for every hour of class time, you are expected to spend at least 3 hours outside class.
- Resources needed: You will need a working computer with software like Word or LibreOffice (free) to work on lab reports and a site like [www.draw.io](http://www.draw.io) (free) to create diagrams. In addition you will need a working computer that is capable of running VirtualBox and enough RAM (at least 4GB, 8-16GB would be best) and disk space (60GB or more) to run VMs.

### Labs

All work must be your own. Use your own words when writing reports – copying and pasting from other sources is considered to be plagiarism and results in a 0. Late submissions of lab reports are not accepted unless you have approval from the instructor 24 hours before the deadline (penalties still apply).

### Exams/Quizzes

Many of the videos will have embedded quizzes – be sure to get to all of them. In addition, there are 11 online timed quizzes: no make-up quizzes but your lowest quiz score will be dropped.

**Final Exam: Thursday, December 17<sup>th</sup>, online**

### Drop Dates

September 22<sup>nd</sup>: Last day to drop a class without a “W”.  
November 11<sup>th</sup>: Last day to drop before Late Drop form is necessary.

### Evaluation

| Item           | Quantity      | Percentage |
|----------------|---------------|------------|
| Labs           | 6             | 42%        |
| Weekly Quizzes | Best 10 of 11 | 25%        |
| Discussions    | 6             | 12 %       |
| Video Quizzes  | 22            | 11%        |
| Final Exam     | 1             | 10%        |

### Grading

| Percentage     | Letter Grade       |
|----------------|--------------------|
| 100 – 94       | A (Excellent)      |
| 93.9 – 90      | A-                 |
| 89.9 – 87.5    | B+ (Good)          |
| 87.4 – 82.5    | B                  |
| 82.4 – 80      | B-                 |
| 79.9 – 77.5    | C+ (Average)       |
| 77.4 – 72.5    | C                  |
| 72.4 – 70.0    | C-                 |
| 69.9 – 67.5    | D+ (Below Average) |
| 67.4 – 60      | D                  |
| 59.9 and below | F (Failing)        |

### Late Work submitted with prior Instructor approval

| Duration         | Penalty      |
|------------------|--------------|
| Less than 1 week | -10% per day |
| More than 1 week | -100%        |

### Important Contacts

Adviser, College of Business and Economics, South Hall 124D

**Course Content**

## CPU Virtualization

- Processes
- Scheduling

## Memory Virtualization

- Memory Management Units
- Address Translation
- Segmentation
- Paging and Translation Lookaside Buffer
- Page tables
- Page faults

## Concurrency

- Locks
- Producer/Consumer
- Semaphores
- Deadlock

## Persistence

- Storage
- I/O and disks
- RAID arrays
- File Systems

**CSIS Program Learning Outcomes**

*Graduates of the Computer Science and Information Systems major will possess the following knowledge, skills and professional orientation, and will be able to:*

- Utilize Object Oriented Programming techniques to analyze, design and develop software applications.
- Understand Computer Organization and Assembly Language concepts
- Understand Operating Systems concepts.
- Setup, configure and maintain a computer network.
- Design, implement, and interact with a structured relational database using GUI and SQL.
- Recognize security issues and be aware of ways to address malware and intrusions.

**College of Business and Economics (CBE) Mission Statement**

The primary mission of the College of Business & Economics is to provide high quality undergraduate programs grounded in the liberal arts, a high quality Master of Business Administration Program, and business outreach services to the Greater St. Croix Valley region.

**College of Business and Economics Learning Outcomes**

College of Business and Economics learning outcomes are posted to the Assurance of Learning Section of the College's web page:

<http://www.uwrf.edu/CBE/AssuranceofLearning/Index.cfm>.

**Rights and Accommodations**

The UWRF promotes safe, inclusive and effective learning environments that protect the rights and support the interests of both students and faculty. For additional information regarding our inclusivity expectations, academic accommodations, academic conduct expectations and processes, and other information, please consult <http://go.uwrf.edu/Syllabi>.

**Visitors Policy**

Students and other academic visitors, including peer observers and prospective students visiting campus, may be admitted with advance permission from the instructor. Non-academic visitors are not permitted.

**Participation Policy**

Students are responsible for making progress in the course, getting caught up with the online course materials, taking quizzes and exams. Logging into the course Canvas site daily is highly recommended.

**Syllabus Changes**

The course syllabus (this document) is subject to change. Students will be notified through the course management system about changes in the syllabus.

**Academic Integrity Policy**

The University policy regarding academic honesty and discipline will be strictly enforced. Students who violate academic integrity in any manner, including plagiarism, cheating, and other forms of dishonesty, will fail the assignment/examination in question and may go through further disciplinary procedures. Plagiarism refers to the use of materials from books, notes and other sources, in the student's written work, without due credit to the sources used; it is the presentation of materials as if these are the student's own. Cheating refers to securing or giving help in a test, unauthorized copying of tests, etc. Other forms of dishonesty would be taking a test in place of another student, etc.

**Practicing skills required in the workplace**

Chances are you will be applying for a job within the next year. CSIS Department instructors are often asked to evaluate students when they apply for jobs. Some questions I have been asked to evaluate CSIS seniors are shown below. To what extent does this applicant:

1. Take the initiative to prioritize and complete tasks without needing supervision?
2. Act with ethics and integrity
3. Exhibit maturity and self-control, even in situations involving conflict or stress (e.g., does not threaten or abuse others, either physically or verbally)?
4. Accept feedback without becoming angry or defensive, and use the feedback to strengthen future performance?
5. Demonstrate trustworthiness, honesty, and high personal standards in dealings with others?
6. Consistently meet or exceed goals and expectations?
7. Remain flexible and adapt to variety on the job (e.g., effectively handle unexpected situations and changing conditions)?
8. Possess strong knowledge of current computer hardware and software?
9. Quickly master new or unfamiliar technology or technical concepts?
10. Work in a disciplined and organized way to complete tasks in a timely manner?
11. Demonstrate dependability (e.g., report consistently, and on time, for appointments, and meetings)?
12. Communicate information, ideas, and data clearly and concisely?
13. Demonstrate technical writing skills in documentation?
14. Have an attention to detail, making sure that problems, actions taken, and activities are thoroughly documented?

Teaching qualities like these are not part of CSIS courses but practicing them in courses and asking for feedback from instructors is highly recommended.