## Syllabus for Computer Science 371

***Computer Architecture and Assembly Language Programming***

***Fall 2021***

**Instructor:** Dr. Randy L. Ribler

**Class Web Page:** <https://faculty.lynchburg.edu/ribler_r/cs371>

**email:** [ribler@lynchburg.edu](mailto:ribler@lynchburg.edu)

**Office Hours:** Office hours will be posted on the class webpage after the first week of classes. I encourage all students to make use of office hours.

**Prerequisite: CS131, CS135, or CS141**

**Course Description:** Three hours lecture. This course introduces the concepts of machine and assembly language programming and computer architecture. The student studies the syntax of   
assembly language and becomes proficient in writing programs in assembly language.

**Course Objectives/Learning Outcomes:**

Students will be able to describe the functions of individual hardware components such as CPU’s, ALU’s, cache and main memories, I/O subsystems, and

Students will be able to program in at least one modern assembly language.

Students will be able to effectively use performance analysis tools to determine the best avenues for increasing program performance.

Students will be able to replace higher-level language inner loops with hand-coded assembler to increase processing speed when applicable.

Students will understand and be able to apply pipelining concepts, both in computer architecture and in software.

Students will understand SIMD (Single Instruction Multiple Data) concepts and be able to employ them in assembly language.

Students will understand binary representations of instructions, signed and unsigned integer data, and floating-point formats.

Students will understand the costs, benefits, and limits of the use of assembly language programming as a means of increasing processing speed.

**Required Resources:**

Students will be required to purchase a student membership to the ACM so that they can access additional materials. The student membership should cost $19. Memberships can be purchased at: <https://services.acm.org/public/qj/quickjoin/qj_control.cfm?_type=Student>

**Recommended Text:**

Modern x86 Assembly Language Programming, Second Edition, by Daniel Kusswurm

**Course Requirements:**

**Attendance:** The student is expected to attend all classes and is responsible for all material presented in class. Some material presented in class will be available nowhere else. Past experience indicates that good attendance is an important factor in achieving successful completion of the course.

**Late Policy:** Assignments should be submitted by 11:59pm on the day that they are due. Late assignments will be penalized 5% per day up to a maximum of 40%. After two weeks, late assignments will not be accepted.

**Plagiarism:** All work must be your own. While it is fine to ask each other questions concerning general concepts, you may not show each other your programs, incorporate code from programs available on the Internet, or exchange any program fragments -- not one line of code. If you are having problems completing your assignments, you are encouraged to meet with the instructor.

**Evaluation Methods:**

**Computer Programs (40%)**

**Exams (50%)**

Exam 1 (15%) (near midterm)

Exam 2 (15%) (near the end of the term)

Comprehensive Final Exam (20%)

**Homework (10%)**

**Computation of Final Grade:**

A z-score will be computed for each assignment. The final grade will be determined from the weighted average of the grades from all assignments. (see Virginia Tech Testing [Memos #6](http://ribler_r.web.lynchburg.edu/VirginiaTechTestingMemos/Memo6-averaged.docx).) However, no student who fails the final exam or leaves two or more programming assignments uncompleted will earn a grade higher than D.

**Center for Accessibility and Disability Resources**

University of Lynchburg is committed to providing all students equal access to learning opportunities. The Center for Accessibility and Disability Resources(CADR) works with students with disabilities (medical, physical, mental health and cognitive) to make arrangements for appropriate, reasonable accommodations. Accommodations are available as applicable in both live and virtual classroom settings. Students registered with CADR who receive approved accommodations are ***required to provide letters of accommodation each semester to each professor if they wish to use their accommodations. A meeting to discuss accommodations the student wishes to implement in individual courses is strongly suggested.*** *Accommodations are not retroactive and begin when the accommodation letter is provided to faculty.*For information about requesting accommodations, please visit <https://www.lynchburg.edu/academics/disability-services/>  or use the contact information below. (Effective: 1/15/21)

**Contact Information**

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| Julia Timmons, Director of the  Center for Accessibility and Disability Resources  1501 Lakeside Drive  Lynchburg, VA  24501  Email: [timmons.j@lynchburg.edu](mailto:timmons.j@lynchburg.edu)  Phone: 434-544-8339  Fax: 434-544-8808 | Meg Dillon, Assistant Director of the  Center for Accessibility and Disability Resources  1501 Lakeside Drive  Lynchburg, VA  24501  Email: [dillon\_ma@lynchburg.edu](mailto:dillon_ma@lynchburg.edu)  Phone: 434-544-8709  Fax: 434-544-8808 |

**Commitment to Diversity, Equity, Inclusion, & Respect for Others :**

The University of Lynchburg is committed to ensuring that diversity, equity, and inclusion are apparent through a campus community climate where all students, faculty, and staff feel welcomed and are treated equitably and with respect. All campus community members are expected to conduct themselves in ways that exemplify respect for people of all groups and identities adhering to personal values without unduly imposing them on others. Furthermore, campus community members should take responsibility to serve as leaders in promoting compassion for others and in challenging prejudices, biases, and discrimination against all individuals and groups whether due to national origin, gender identity, gender expression, age, marital status, religion, race, socioeconomic status, parental status, political beliefs, diversity of thought, sexual orientation identity, physical/mental ability, genetic information or any other self-identifiers. We must treat everyone with respect and at no time should they harass, assault, or violate the privacy of other persons. Victims of human rights-related incidents or witnesses to them are encouraged to report such incidents. Reports are secure, confidential, and only certain designated University officials have access to the information reported.

To report a bias incident [click here](https://www.lynchburg.edu/about/office-of-equity-and-inclusion/bias-education-response-team-bert/), or call the Campus Conduct Hotline toll-free at 866.943.5787, or contact Dr. Robert L. Canida, II, Vice President for Inclusive Excellence at [canida\_rl@lynchburg.edu](mailto:canida_rl@lynchburg.edu).

**Mandatory Reporting and Faculty Responsibility**

University of Lynchburg faculty members are committed to supporting students and upholding the University's non-discrimination policy. Under Title IX, discrimination based upon sex and gender is prohibited. If you experience an incident of sex- or gender-based discrimination, we encourage you to report it. While you may talk to a faculty member, understand that as a "Responsible Employee" of the University, the faculty member MUST report to the college's Title IX Coordinator what you share. If you would like to speak with someone who may be able to afford you privacy or confidentiality, there are people who can meet with you.  Faculty can help direct you or you may refer to the University's Interpersonal Misconduct policy available at [www.lynchburg.edu/im-policy](http://www.lynchburg.edu/im-policy) or reach out to the Title IX Coordinator directly at titleix@lynchburg.edu.

**Inquire**: frame questions that address issues and uncertainties across a range of disciplines. The student will

* + recognize precise and complete statements of problems.
  + recognize what information is necessary in order to solve given problems.
  + ask essential questions about given problems.
  + ask questions for further study regarding problems and reading assignments.
  + develop an approach for investigating a significant  project.

**Explore:** investigate issues in depth and detail. The student will

* + think creatively about possible solutions to problems.
  + use data collection tools, laboratory computer systems, and simulations to gain insights into network protocol complexities.
  + comprehend given problems, reading assignments, and the arguments of others.
* **Conclude**: develop informed responses to issues.  
  The student will
  + marshal evidence in support of a solution to a problem or conclusion in an argument.
  + articulate an appropriate conclusion based on the evidence.
* **Persuade**: convince others of the validity and value of conclusions.  
  The student will
  + produce precise and complete statements of solutions to problems.
  + construct effective written arguments based in evidence, reason and understanding.
  + deliver effective oral arguments based in evidence, reason and understanding.
* **Engage:** use knowledge and abilities for the good of self and society.  
  The student will
  + demonstrate the ability to project how the use of technologies might work toward the good or detriment of society.
  + value achievements in Computer Science for their intrinsic worth.
  + work effectively with other members of a group to solve problems and present their solutions.