# CPS 330

# Assembly Language and Computer Architecture

# TF & Online, 11:00am-12:15pm, VH 217

Lab Times

| Section 01 | Section 02 |
|---|---|
| T, 2:00pm-4:50pm, HUM 301 | F, 2:00pm-4:50pm, HUM 301 |

**Instructor:** Charles DeGennaro
Email: degennac1@newpaltz.edu
Office: SH247
Office Hours: T 12:30-2:30pm in SH260. Email to set up meeting outside this time.

**Lab Instructor:** Nathan Gopee
Email: gopeen1@newpaltz.edu
Office: SH260
Office Hours: TF 1:00-2:00pm

This syllabus is subject to change to reflect updates to scheduling throughout the course. Please ensure you are referencing the latest version available on Brightspace before asking questions.

**Course Description:** Provides an "under the hood" examination of computer systems. Topics include number systems, machine language, assembly language, linking and loading, instruction set architecture, microarchitecture, memory systems, and high-level languages at the assembly level.
**Prerequisite(s):** CPS310 Minimum Grade of C-
**Credit Hours:** 4

**Required Text:** *C and C++ Under the Hood*, 2nd Edition
**Author:** Anthony J. Dos Reis; **ISBN-13:** 979-8514952076
The text is available on amazon here: https://www.amazon.com/C-Under-Hood-2nd/dp/B09B74P6C4. This text will be used extensively and commonly referenced throughout the course. It is expected that you will have a copy of the text by the second week of classes.

### Student Learning Objectives:

At the completion of this course, students will be able to:

1. Compute in Binary and Hexadecimal
2. Program in C
3. Write Machine Language programs
4. Write Assembly Language programs

5. Hand assemble Assembly Language programs
6. Hand compile C code
7. Write an interpreter, an assembler, and a linker
8. Understand the advantages and disadvantages of various architectures
9. Understand the advantages and disadvantages of register and stack architectures

### Grade Distribution:

Extra points will be achievable through bonus credit and optional assignments throughout the semester.

| | |
|---|---|
| i1 Project | 7.5% |
| a1 Project | 10% |
| Linker Project | 7.5% |
| Participation Quizzes | 10% |
| Exam 1 | 10% |
| Exam 2 | 10% |
| Final Exam | 20% |
| Labs | 15% |
| Lab Quizzes | 10% |
| Total | 100% + Bonus |

### Letter Grade Distribution:

| | | | |
|---|---|---|---|
| >= 93.0% | A | 73.0 - 76.9% | C |
| 90.0 - 92.9% | A- | 70.0 - 72.9% | C- |
| 87.0 - 89.9% | B+ | 67.0 - 69.9% | D+ |
| 83.0 - 86.9% | B | 63.0 - 66.9% | D |
| 80.0 - 82.9% | B- | 60.0 - 62.9% | D- |
| 77.0 - 79.9% | C+ | <= 59.9% | F |

### Software Package:

The software package is available for download on Brightspace, under the "Software Package" tab along with videos to walkthrough and verify that the installation is correct. Please install and follow the instructions on Brightspace to ensure it is working before the first lab. If you cannot get it working the lab instructor will be able to assist you.

### Course Policies:

- **General**
  - The topics list at the end of the syllabus is variable, and will be continually updated in the syllabus as topics shift.
  - Exams are closed book, closed notes. For each exam, one standard 8.5"x11" sheet of **handwritten** notes is permitted to be brought in as notes. Notes written on a tablet and printed out are allowed, as long as there are no images on your document. Appendix A and B from the textbook will be made available during each exam. Basic calculators are allowed.

- If it is known in advance that a quiz or exam will be missed for a valid reason (sickness, travel concerns due to weather, etc.), please email me (and the lab instructor when applicable) immediately, so that we can make the correct accommodations for you. Failure to provide advanced notice will result in the inability to makeup the quiz or exam. (Except in extreme and reasonable circumstances)
- If you notice that a post is missing from Brightspace when it should be there (labs, lab solutions, lecture recordings, etc.), please contact me so I can fix the errors. Please confirm with this syllabus that the post should be there before contacting me.
- Please keep emails professional, with a short greeting and a short closing. (Dear Charlie / Hello Professor...Kind regards, {name} / -{name}). For any email regarding this class, please include "ASM" or "330" in the subject of the email, otherwise I may miss your email and not respond to it. I get many emails and have filters in place to move important emails to the correct locations, so the subject is important for me to get to your email.
- Any problems or questions that cannot be answered immediately at the end of class must be emailed to the instructor to guarantee a response will be given. This also establishes a paper trail to look back to in the future should any disputes arise.

- **Course Modality**
  - This course is provided in a hybrid format. Lecture's will either take place in person, or be pre-recorded and posted at the standard lecture time. There is no set schedule for when a lecture will be in person or recorded, but it will be known at least a week in advance whether a lecture will be in person or not. A general rule of thumb is that most (hopefully all) Tuesday lectures will be in person, and most Friday lectures will be recorded.
  - Participation Quizzes are quizzes that will be released on Brightspace alongside every recorded lecture. These quizzes are to check that you have understood the main take-aways from that day's recording. The participation quizzes are due by midnight the day **after** the recorded lecture is posted (If a lecture is posted on Friday, it is due Saturday before midnight). The lowest participation quiz grade will be dropped.

- **Labs**
  - At the beginning of every lab there will be a lab quiz. The quiz will always cover material from the previous weeks lab. If it is known you will miss a lab quiz, you must let us know **before** lab, and schedule with the TA to take the quiz **no later than 1 week** after your lab session. In dire circumstances, discuss with the instructor to work out a resolution.
  - The lab quizzes are closed book, closed notes. You will be allowed to work with atmost 1 other student on the quiz, and you will both share the same grade. Appendix A and B will be provided during lab quizzes when applicable. Basic calculators are allowed.
  - Lab attendance is **mandatory**, and each student must remain present in the lab until they have completed their lab, shown the completed lab to the lab instructor, and are granted permission to leave early. Lab attendance counts for 33% of your lab grade.
  - Labs will be posted every Monday at 11:59pm.
  - Labs are due every Friday by 11:59pm the week after the lab is assigned. (For example, a lab posted on 9/2 is due by midnight on 9/12)

- The labs are mainly graded for **completeness**, not correctness. Correct answers will score higher, however it is more important to put in a decent effort at solving the problems.
- Each day a lab is late will incur a 2 point penalty on the lab.
- Lab solutions will be posted on Mondays at 11:59pm, 3 days after each lab is due. Labs submitted after lab solutions are posted will receive a 0.
- The lowest lab and lab quiz grade will be dropped.

- **Projects**
  - There will be 3 projects given throughout the semester, which combined make up 25% of your total grade. All projects will be due at 11:59pm the date it is due. **Do not come to me within 2 days of a project being due looking for help.**
  - The projects and their due dates can be found in the tentative schedule at the end of this syllabus.
  - Students may work together on projects, but **copying another student's work is plagiarism, and will be penalized.** If you did collaborate with another, please comment the names of everyone you work with at the top of your project.

- **Attendance and Absences**
  - Attendance to lectures is highly expected. Class notes will not be posted.
  - Attendance will be taken randomly at various times throughout the semester, being worth 2 bonus points for each lecture where attendance was taken.
  - Students are responsible for all missed work, regardless of the reason for absence. It is also the absentee's responsibility to get all missing notes or materials. If class is missed, please refer to the tentative schedule at the end of the syllabus and read through the textbook pages covered that day.

- **Late Work**
  - Students are allotted 5 'sick days' throughout the semester where any late work that is not an exam or quiz will be accepted with no penalty.
  - Sick days will be used automatically when an assignment is turned in late. If an assignment is late and the student does not have enough sick days to cover the late assignment, then the work will be graded at half marks and the sick days will be consumed.
  - After a student has used all 5 of their sick days, any late work submitted will be graded at half marks.
  - Students can check how many sick days they have remaining in the 'Grades' tab in Brightspace. Note that the sick day 'grade' item is purely for your visual aid, and is not in any way counted towards your actual final grade.

- **Bonus**
  - Bonus opportunities may be announced during lectures, and will be opened up under the "Bonus" tab in Brightspace. Bonuses will typically take the form of a challenging problem to complete, which demonstrates mastery over a topic.

– If you made it this far, thank you for reading the syllabus diligently! For 5 bonus points, email me a picture of your pet(s) before the first Friday lecture on 8/29! If you don't have a pet, please send me your favorite cat picture from the internet. (Don't forget to use the proper email subject mentioned above!)

**Tentative Course Outline**: On the last page of the syllabus is the complete schedule for material to be covered, and important dates which are in red. The weekly coverage might change as it depends on the progress of the class. Textbook pages are what will be covered in class, however it is highly recommended to read these pages as well.

### Academic Honesty Policy Summary:

**Introduction**

Please familiarize yourself with the academic policies listed by SUNY New Paltz found at https://www.newpaltz.edu/acadaff/academic-policies-including-academic-integrity/.

**Instructor's Intended Purpose**

The student's work must match the instructor's intended purpose for an assignment. While the instructor will establish the intent of an assignment, each student must clarify outstanding questions of that intent for a given assignment.

**Declaration**

Online submission of, or placing one's name on an exam, assignment, or any course document is a statement of academic honor that states the student has not received or given inappropriate assistance in completing the graded article and that the student has complied with the Academic Integrity Policy (https://www.newpaltz.edu/ugc/policies/policies_integrity.html) in that work.

**Consequences**

An instructor may impose a sanction on the student that varies depending upon the instructor's evaluation of the nature and gravity of the offense. Possible sanctions include but are not limited to, the following: (1) Require the student to redo the assignment; (2) Require the student to complete another assignment; (3) Assign a grade of zero to the assignment; (4) Assign a final grade of "F" for the course. A student may appeal these decisions according to the guidelines provided in the Academic Integrity Policy stated above.

**Disability Accomodation Statement**

Students needing classroom and/or testing accommodations related to a disability should contact the Disability Resource Center (Student Union, Room 210, 845-257-3020) as close as possible to the beginning of the semester. The DRC will then provide students' instructors with an Accommodation Memo verifying the need for accommodations. Specific questions about services and accommodations may be directed to Deanna Knapp, Assistant Director (knappd@newpaltz.edu) or Jean Vizvary, Director (vizvaryj@newpaltz.edu).

**Veteran & Military Services Statement**

New Paltz's Office of Veteran & Military Services (OVMS) is committed to serving the needs of veterans, service members and their dependents during their transition from military life to student life. Student veterans, service members or their dependents who need assistance while attending SUNY New Paltz may refer to www.newpaltz.edu/veterans; call 845- 257-3120, -3124 or -3074; e-mail np-vms@newpaltz.edu; or stop by the Student Union, Room 100 South.

**Student Evaluation of Instruction**

You are responsible for completing the Student Evaluation of Instruction (SEI) for this course and for all your courses with an enrollment of five (5) or more students. I value your feedback and actually read every comment, which will be used to improve my teaching and planning.

**Public Health Statement (Spring 2023)**

**For students testing positive for COVID:** Per current guidance from the CDC and the New York State Department of Health (DOH), those who have COVID must isolate for five days after becoming symptomatic or testing positive and must wear a well-fitted mask on days 6-10. Students must report positive cases to the Student Health Center (845-257-3400 or healthservice@newpaltz.edu) as soon as possible. Notices of positive cases reported to the Student Health Center will continue to be sent to the student's in-person faculty to validate excused absences.

**For students exposed to COVID:** Current CDC and New York State DOH guidelines require that those who are not "up to date" with vaccinations (including having a booster when eligible) and who are exposed to COVID through a close contact must quarantine for five days after exposure. If documentation is required, see Affirmation of Quarantine.

**Last date to request Course Withdrawal**: November 14, 2025

**Last date to opt for Satisfactory/Unsatisfactory option**: December 8, 2025

| Week | Date | Content | Lab |
|---|---|---|---|
| Week 1 | T 8/26 | • Chapter 1: Number Systems pg. 1-10<br>• Read Syllabus before Friday class | Lab 1 Posted 8/26 |
| | F 8/29 | • Chapter 1: Number Systems pg. 11-21 | |
| Week 2 | T 9/2 | • Chapter 2: Machine Language pg. 24-30<br>• Chapter 3: Assembly Language pg. 42-45 | Lab 2 Posted 9/2 |
| | F 9/5 | • Chapter 2: Machine Language pg. 32-38<br>• Chapter 3: Assembly Language pg. 45-47 | Lab 1 Due 9/5 |
| Week 3 | T 9/9 | • Chapter 2: Machine Language pg. 31-32, 39<br>• Chapter 3: Assembly Language pg. 48-53 | Lab 3 Posted 9/9 |
| | F 9/12 | • Chapter 3: Assembly Language pg. 54-59 | Lab 2 Due 9/12 |
| Week 4 | T 9/16 | • Chapter 3: Assembly Language pg. 63-68 | Lab 4 Posted 9/16 |
| | F 9/19 | • Overflow day for content not finished<br>• Review for Exam 1 | Lab 3 Due 9/19 |
| Week 5 | T 9/23 | • Exam 1 - Chapters 1-3 | Lab 5 Posted 9/23 |
| | F 9/26 | • Chapter 4: Function Calls and Returns<br>• pg. 72-79 | Lab 4 Due 9/26 |
| Week 6 | T 9/30 | • Chapter 5: Global, Dynamic Local,<br>• and Static Local Variables pg. 80-88<br>• Introduction to i1 Project pg. 258-261 | Lab 6 Posted 9/30 |
| | F 10/3 | • Discuss Solutions to Exam 1<br>• In class time to work on project | Lab 5 Due 10/3 |
| Week 7 | T 10/7 | • Chapter 6: Decisions, Loops, and<br>• Recursion pg. 89-98 | Lab 7 Posted 10/7 |
| | F 10/10 | • Chapter 7: Pointers pg. 100-108 | Lab 6 Due 10/10 |
| Week 8 | T 10/14 | • Fall Break: No Classes | |
| | F 10/17 | • Chapter 8: Parameter Passing pg. 110-115 | |
| Week 9 | T 10/21 | • i1 Project Due<br>• Introduction to a1 Project pg. 262-265<br>• In class time to work on project | Lab 8 Posted 10/21 |
| | F 10/24 | • Chapter 9: Structs pg. 129-137 | Lab 7 Due 10/24 |
| Week 10 | T 10/28 | • Chapter 10: Arrays pg. 138-146 | Lab 9 Posted 10/28 |
| | F 10/31 | • Chapter 10: Arrays pg. 146-152 | Lab 8 Due 10/31 |
| Week 11 | T 11/4 | • Overflow day for content not finished<br>• Review for Exam 2 | Lab 10 Posted 11/4 |
| | F 11/7 | • Exam 2 - Chapters 4-10 | Lab 9 Due 11/7 |
| Week 12 | T 11/11 | • a1 Project Due<br>• Chapter 11: Multiplication and Division<br>• pg. 154-158<br>• In class time to work on project | Lab 11 Posted 11/11 |
| | F 11/14 | • Chapter 12: Linking pg. 161-169<br>• Discuss Solutions to Exam 2 | Lab 10 Due 11/14 |
| Week 13 | T 11/18 | • Chapter 12: Linking pg. 169-178<br>• Introduction to linker Project pg. 269-272 | Lab 12 Posted 11/18 |
| | F 11/21 | • Linking Overview<br>• Overflow day for content not finished | Lab 11 Due 11/21 |
| Week 14 | T 11/25 | • Review for Final | Lab 13 Posted 11/25 |
| | F 11/28 | • Thanksgiving Break: No Classes | |
| Week 15 | T 12/2 | • Review for Final | Lab 14 Posted 12/2 |
| | F 12/5 | • Overflow day for content not finished | Lab 12 Due 12/5 |
| Week 16 | T 12/9 | • Make-Up Day: No Classes | |
| | T 12/16 | • Final: 10:15am - 12:15pm<br>• linker Project Due | Lab 13 Due 12/12 |