

**CMPSC 401
Compiler Development
Spring 2019**

Syllabus

Course Instructor

Dr. Janyl Jumadinova

Office Location: Alden Hall 105

Office Phone: +1 814-332-2881

Email: jjumadinova@allegheny.edu

Web Site: <http://www.cs.allegheny.edu/sites/jjumadinova/>

Instructor's Office Hours

- Monday: 10:00 am – 11:00 am (10 minute time slots) and 2:00 pm – 4:00 pm (15 minute slots)
- Wednesday, Friday: 10:00 am – 11:00 am (10 minute time slots)
- Thursday: 1:30 pm - 2:30 pm (10 minute time slots)

To schedule a meeting with me during the office hours, please go to <https://cs.allegheny.edu/sites/jjumadinova/schedule>, click on the “book an appointment” link and select the available date and time of your choice. You can schedule an appointment outside of my office hours via course’s Slack channel or email.

Course Meeting Schedule

Discussion, and Group Work session: Alden **101**, Tuesday and Thursday 11:00am to 12:15pm

Laboratory session: Alden **109**, Tuesday 2:30pm to 4:20pm

Course Resources

Course Web page: <https://cs.allegheny.edu/sites/jjumadinova/teaching/401>

You can find the most up-to-date schedule of the course and the required readings on the course’s page.

Github Organization: <https://github.com/Allegheny-Computer-Science-401-S2019>

Github, a cloud based system, will be used for sharing course materials by the instructor and for submitting assignments by the students.

Slack channel: <https://cs401s2019.slack.com/>

Slack will be used for discussion and communication outside of the classroom.

Academic Bulletin Course Description

An introduction to the fundamental translators for programming languages and an examination of the interactions between the design of programming languages, compilers, and run-time environments. Participating in hands-on activities that often require

teamwork, students learn how compilation techniques support the process of software development. During a weekly laboratory session students use advanced compiler creation tools to incrementally design and implement a complete compiler, reporting on their results through both written reports and oral presentations.

Prerequisite: CMPSC 201.

Distribution Requirements:QR, SP.

Course Objectives

This course will introduce students to the foundational concepts that underlie the design and implementation of the compiler and runtime systems for high-level languages and the interaction between language design, compiler design, and runtime organization. The main goal of the course is to equip students with the ability to understand conceptual compilation design and implementation details in order to facilitate them in efficient software development. The course will discuss key issues related to compiler design, such as lexical and syntactic analysis, type-checking, program analysis, code generation and optimization, memory management, and runtime organization. To engage with these fundamental concepts through experimentation, students will also gain hands-on experience through various assignments that built on each other.

Learning Objectives

At the completion of this class, a student must be able to distinguish the main phases of a state-of-the-art compiler and be comfortable with the fundamental concepts that underly these phases. Students should be moderately experienced in using different software tools and programming languages for compiler development. Finally, students must be able to develop and apply a strong knowledge of complex software techniques following high-level specifications and be able to construct a small compiler with a minimum of effort based on an understanding of general principles of language design and implementation.

Required Textbooks

“[Compiler Design: Theory, Tools, and Examples](#)” by Seth Bergmann.

“[Basics of Compiler Design](#)” (10th anniversary edition) by Torben Mogensen.

Additional course content will be provided by the instructor.

Class Policies

Grading

The grade that a student receives in this class will be based on the following categories. All percentages are approximate and it is possible for the assigned percentages to be changed during the academic semester, if a need arises to do so.

Class Participation	15%
Laboratory Assignments	50%
Topic Presentations (approx. 2)	10%
Quizzes (approx. 3)	15%
Project	10%
Total	100%

These grading categories have the following definitions:

- *Class Participation*: All students are required to actively participate during all of the class sessions. Your participation will take forms of completing class exercises, answering questions about the required reading assignments, and asking constructive questions. You must also regularly participate in the discussions on the Slack channels for this course.
- *Laboratory Assignments*: Lab assignments invite students to explore different tools and techniques for designing, implementing, evaluating, and documenting various phases of a compiler. In order to produce a comprehensive and working compiler at the end of the semester, each lab will be built on the previous lab(s). Additionally, students will be required to participate in peer review and demonstration of each of their lab deliverable.
- *Quizzes*: Each quiz is a short, timed, multiple choice assessment of the key concepts and terms introduced in class. Unless prior arrangements are made with the course instructor, all quizzes have to be taken by all students on the scheduled dates, which will be confirmed at least one week in advance of each quiz.
- *Project*: The course project will present you with an opportunity to design and implement a correct and carefully evaluated solution for a particular problem related to compilers. This assignment will be open-ended and will give students an opportunity to explore their areas of interest. The details for the final project will be given approximately one month before the finals week.

Assignment Submission

All assignments will have a stated due date and are to be turned in electronically on that due date. You must follow proper procedures for submitting your completed programs in order for them to be graded. You will be given instructions on how to do that with your first programming assignment.

Late assignments will be accepted for up to one week past the assigned due date with a 15% penalty. All of the late assignments must be submitted at the beginning of the session that is scheduled one week after the due date. Unless special arrangements are made with the course instructor, no assignments will be accepted after the late deadline.

Attendance

It is mandatory for all students to attend all of the class and laboratory sessions. If you will not be able to attend a session, then please see me at least one week in advance to describe your situation. In case you missed a class because of an emergency, please notify me as soon as possible. Students

who miss more than five unexcused sessions will have their final grade in the course reduced by one letter grade. Frequent or prolonged absences due to illness should be documented by the student's doctor, the Health Center, the Dean of Students' Office, or the office of Student Disability Services. If you need to miss class due to a religious observance, please speak to me in advance to make appropriate arrangements.

Class Preparation

In order to minimize confusion and maximize learning, students must invest time to prepare for the class discussions, lectures, and laboratory sessions. During the class periods, the course instructor will often pose questions that could require group discussion, the creation or analysis of a program, or a group presentation. In order to help students remain organized and effectively prepare for classes, the course instructor will maintain a class schedule with reading assignments and presentation slides.

Seeking Assistance

Students who are struggling to understand the knowledge and skills developed in a class or a laboratory session are encouraged to seek assistance from the course instructor. Students who need the course instructor's assistance should schedule a meeting through her Web site.

A Note on extenuating circumstances

If you should find yourself in difficult circumstances that significantly interfere with your ability to prepare for this class and to complete assignments, please inform me immediately so that we can work something out together! Do not wait until the last day of class to ask for exceptions to what is stated in this syllabus. In such a situation, you may also find it helpful to contact one of the available resources on campus:

The Maytum Learning Commons, Library/Academic Commons, 814-332-2898

You may request an individual tutor through Learning Commons:

<http://sites.allegHENY.edu/learningcommons/tutoring/>

Allegheny College Counseling Center, Schultz Hall, 814-332-4368

Winslow Health Center, Schultz Hall, 814-332-4355

Student Life, Campus Center, 3rd Floor, 814-332-2800

Special Needs and Disability

Students with disabilities who believe they may need accommodations in this class are encouraged to contact Disability Services at (814) 332-2898. Disability Services is part of the Learning Commons and is located in Pelletier Library. Please do this as soon as possible to ensure that approved accommodations are implemented in a timely fashion.

Honor Code

All students enrolled at Allegheny College are bound by the Honor Code. It is expected that your behaviour will reflect that commitment. To this end, we expect that you will adhere to the following Department Policy:

Department of Computer Science Honor Code Policy

It is recognized that an important part of the learning process in any course, and particularly in computer science, derives from thoughtful discussions with teachers, student assistants, and fellow students. Such dialogue is encouraged. However, it is necessary to distinguish carefully between the student who discusses the principles underlying a problem with others, and the student who produces assignments that are identical to, or merely variations on, someone else's work. It will therefore be understood that all assignments submitted to faculty of the Department of Computer Science are to be the original work of the student submitting the assignment, and should be signed in accordance with the provisions of the Honor Code. Appropriate action will be taken when assignments give evidence that they were derived from the work of others.

You are encouraged to periodically review the specifics of the Honor Code as stated in the College Catalogue and the Compass.