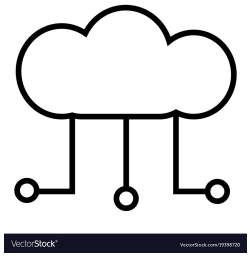
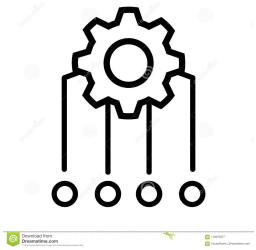
CMPSC 402 – Cloud Computing

Course Syllabus, Fall 2020
Allegheny College



Course Instructor:
Dr. Aravind Mohan
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Office Phone: +1 8143322883
Email: amohan@allegheny.edu
Web Site: https://www.cs.allegheny.edu/sites/amohan/

Instructors Office Hours

- Monday, Wednesday, Friday: 11:15 am –12:15 pm (15-minute time slots)
- Tuesday, Thursday: 10:00 am –11:30 am (15-minute time slots)

To schedule a meeting with me during my office hours, please visit my web site (teaching page) and click the Schedule link in the top right-hand corner. The google calendar page has an option to browse my office hours or schedule an appointment by clicking the correct link and then reserving an open time slot. The instructor will hold virtual meetings with students during his office hours. Students are also encouraged to post appropriate questions to a channel in Slack, which is available at https://cs402fall20.slack.com/

Course Meeting Schedule
Lecture: Monday and Wednesday, 10:20 am –11:10 am
Practical: Friday, 10:20 am –11:10 am
Lab: Monday, 03:00 pm –04:50 pm

Course Description
A study of the principles for dealing with the data sets and the cloud-based distributed systems used by networked services. Participating in hands-on activities that often require teamwork, students investigate topics such as data collection and the scheduling and configuration of cloud-based computation, additionally creating and assessing the components of a distributed system. Leveraging insights and tools from an industry partner, students also learn about existing cloud computing platforms and identify methods for improving their efficiency. During a weekly laboratory session, students use advanced distributed computing platforms to complete projects, reporting on their results through both written documents and oral presentations. Students are invited to use their own departmentally approved laptop in this course; a limited number of laptops are available for use during class and lab sessions.

Prerequisites: Computer Science 201

Required Texts and Materials
There is not a single required textbook for this class. Reading assignments will be provided by the course instructor as required.

Learning Objectives
By the end of this course, you should know how to answer the following questions, at least in part:

1. $\mathbf{Lo_1}$ - "What are the fundamental principles behind cloud-based distributed systems?"
2. $\mathbf{Lo_2}$ - "How to collect, streamline, and share web 2.0 datasets?"
3. $\mathbf{Lo_3}$ - "What is the scheduling problem in Cloud Computing? and how do we solve it?"
4. $\mathbf{Lo_4}$ - "How to set up and integrate open source Cloud platforms?"

You'll also learn:

1. how to compare the performance efficiency of single versus multithreaded programs;
2. how to design and develop networked services related to the Cloud;
3. how to integrate data in multiple formats such as XML, JSON, HTML, and SQL;
4. how to model and schedule a cloud workflow effectively;
5. how to set up and integrate Apache Hadoop platform;

COVID-19 specific information

- **Remote Attendance:** If you are participating entirely remotely this semester and relying on technology to attend class meetings, occasional technology problems that disrupt your participation will not harm your participation grade, but as with illnesses and family emergencies, chronic absences, for this reason, will require a more extensive discussion with me and may impact your grade.
- **Face Coverings and Physical Distancing:** A mask covering both your mouth and your nose is required for all in-person activities, per College policy; you will not be permitted to enter or stay in a classroom or other learning space without a face covering, and class time missed for this reason may count against your participation grade. Face coverings are also required for in-person office hours and consultations with other campus professionals. Physical distancing must be respected at all times in the classroom. Chairs will be positioned 6 feet apart and should remain so.
- **Illness and In-person Attendance:** If you feel ill, please stay in your residence and complete the daily health screening, and err on the side of caution when deciding whether or not to come to class. Especially if you feel feverish or have a cough, please avoid contact with others; if you feel like you'd like to "power through" class rather than miss it and have to make it up, please do so remotely.
- **Keeping Devices Charged:** You will need to ensure that your laptop, tablet, or other device is sufficiently charged so that you may participate in class(es). Even if you are in-person in the classroom, you may need to use a device, especially as you will be 6 feet from your nearest peer. It wont be possible for all students to charge their devices at once in the classroom, so please make sure you bring the power cord(s) for your devices to class, pack a power strip if you have multiple devices, and pay attention to the power meter on your device.

Teaching and Learning Methods
The main mode of learning in this class is following along with the posted course material, doing class activities, and completing reading assignments. The instructor may ask questions to stimulate thinking and participation. Students comments and questions are highly encouraged via the course Slack channel. Online resources may also be used to supplement lectures and discussions. Lectures are delivered to all students simultaneously during scheduled class time with some students in the classroom and other students remote. To maintain physical distancing and to implement the College's healthy safety guidelines, students are divided into two groups so that we rotate attending class in person and remotely. Course activities will be planned so they are engaging for both in-room and remote students. Members of group A are expected to attend the class in-person on Mondays and online on Wednesdays. Members of group B are expected to attend the class in-person on Wednesdays and online on Mondays. Students who had opted to be remote are expected to attend the class online during their scheduled timings. If a student is unable to attend a class session, then proper arrangement should be done by consulting the Professor. A list of students registered in the class, and their respective group details are shared on the next page:

Student Name	Group	Day/Time
Anthony Baldeosingh	A	Monday 10:20 am to 11:10 am
Noor Buchi	B	Wednesday 10:20 am to 11:10 am
Adam Cook	A	Monday 10:20 am to 11:10 am
Megan Corletti	B	Wednesday 10:20 am to 11:10 am
Jordan Durci	A	Monday 10:20 am to 11:10 am
Haeley Griffin	B	Wednesday 10:20 am to 11:10 am
Alexandra Heinle	A	Monday 10:20 am to 11:10 am
Devin Ho	B	Wednesday 10:20 am to 11:10 am
Nathan Loria	A	Monday 10:20 am to 11:10 am
Robert McMaster	B	Wednesday 10:20 am to 11:10 am
Charles Misback	A	Monday 10:20 am to 11:10 am
Sweta Rauniyar	B	Wednesday 10:20 am to 11:10 am
Christopher Stephenson	A	Monday 10:20 am to 11:10 am
Cory Wiard	B	Wednesday 10:20 am to 11:10 am
Jordan Wilson	A	Monday 10:20 am to 11:10 am
Elisia Wright	B	Wednesday 10:20 am to 11:10 am
Alexander Yarkosky	A	Monday 10:20 am to 11:10 am
Enpu You	B	Wednesday 10:20 am to 11:10 am
Pedro Campo	A	Monday 10:20 am to 11:10 am

Table 1: Tentative Group Schedule, Fall 2020

Lecture Structure
Lecture sessions will have the following format:

- 50 mins of lecture content, which will include multiple segments of:
  1. Listening to lectures.
  2. Exploring and enhancing the provided code.
  3. Attempting practice problems and/or interacting with non-code sample material.
  4. Making detailed notes from class discussions.
- A feedback form may be provided regularly, to assess the student's understanding level of the course material.

Practical Session Structure
A practical session will include the following components:

- Doing one or more activities (either individual or team-based).
- The activities may involve solving some problems in the paper, and/or implementing one or more programs. This session is intended for exploration of recent topic(s) from lecture discussions, graded for Practical credit.
- All practical sessions will be conducted remotely.

Lab Session Structure
A laboratory session will include the following components:

- A short video will be provided along with the lab sheet. In this video, an overview of the lab specification will be presented to the students.

- A 100-minute in-depth exploration of some topic(s) from the recent course material, graded for Lab credit.
- All laboratory sessions will be conducted remotely.

Grading and Evaluation

The grading and evaluation process will be transparent to the students. At any time during the semester, students may monitor their progress by looking at the Allegheny College Canvas grade book. All the graded activities will be logged in the grade book. The grade book is accessible to the students who are registered in the course. If a student finds any grading discrepancy, it is highly recommended that this issue should be immediately discussed with the Instructor within a week from the time that the graded work was returned. The total grade for the course will be based on the following, weighted appropriately:

- Practical Assignments (15%)
- Lab Assignments (35%)
- Skill Tests (15%)
- Course Project (25%)
- Class Participation (10%)

A more detailed breakdown of the expectations for grades in the course is as follows:

- **Practical Assignments:** A practical assignment will be released to students during Friday class timings. These assignments allow students to enhance the technical skills that they learned in the previous class and intended to prepare for the challenges imposed in the laboratory sessions. The assignments will be graded based on a credit/no credit basis.
- **Lab Assignments:** During laboratory sessions, students are expected to investigate some of the topics that were discussed during the lecture session, in more detail. This investigation will take the form of solving one or more coding challenges, answering one or more problems prompted in class discussions, and/or a guided walkthrough of a new concept. All laboratory sessions will be conducted remotely this semester. See the **Assignment Submission and Late Policy** section of this syllabus for details about the course Late Policy.
- **Skill Tests:** Once in two to three weeks, an online skill test will be administered that serves to test your knowledge on some of the fundamental topics discussed in the course. Questions in the test may be either strictly multiple-choice or a combination of multiple-choice and descriptive questions. There will be a grade book administered by the course instructor and all the graded activities will be logged in the grade book. See the **Grading and Evaluation** section of this syllabus for details about the course grade book.
- **Course Project:** This course has a final project component for students to demonstrate what they have learned during the semester. More details about the requirements of the project will be shared at a later point.
- **Class Participation:** Students are expected to attend and participate in lecture and laboratory sessions based on the schedule provided in Table-1 of this document. Interaction with the instructor and your classmates is important in any Allegheny course. Students are expected to join discussions on the course Slack channel, attend virtual office hours with the instructor, and providing feedback on the pace and content of the course to the instructor. Please refer to the COVID-19 section above for more details.

Assignment Submission and Late Policy

Every assignment has a due date and time. Failure to hand in the assignment by the deadline will result in a late submission penalty. Assignments handed in within one week of the deadline will receive automatic grade reductions of 20% (in addition to any points deducted for errors). Assignments will not be accepted more than one week past the deadline unless you can provide documented extenuating circumstances. Any extenuating circumstances must be documented through the Learning Commons, Counseling Center, Dean of Students Office, Health Center, or other authoritative sources.

If you are unable to attend class or lab for any reason beyond illness or injury, you must make arrangements with the course instructor to turn in assignments before class. Exams must be taken at scheduled times. This includes the final exam. Please check the syllabus and with the instructor one week before making any travel plans for the end of the semester or around breaks. Missed exams will receive a grade of zero without a documented illness or emergency.

Statement of Community

Allegheny students and employees are committed to creating an inclusive, respectful and safe residential learning

community that will actively confront and challenge racism, sexism, heterosexism, religious bigotry, and other forms of harassment and discrimination. We encourage individual growth by promoting a free exchange of ideas in a setting that values diversity, trust, and equality. So that the right of all to participate in a shared learning experience is upheld, Allegheny affirms its commitment to the principles of freedom of speech and inquiry, while at the same time fostering responsibility and accountability in the exercise of these freedoms.

Diversity & Inclusion
At Allegheny College, we understand that a diverse and inclusive learning environment inspires creativity and innovation, which are essential to liberal arts education. We also know that to address current and emerging national and global challenges, it is important to learn with and from people who have different backgrounds, thoughts, and experiences.

We would like to create a learning environment in our class that supports a diversity of thoughts, perspectives, and experiences, and honors your identities (including race, gender, class, sexuality, ability, socioeconomic status, politics, religion, etc.). We (like many people) are still in the process of learning about diverse perspectives and identities. If something is said in class (by anyone) that made you feel uncomfortable, please talk to the instructor about it. If you feel like your performance in the class is being impacted by your experiences outside of class, please dont hesitate to come and talk with the instructor.

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

Learning Commons
If you are not already, you should become familiar with the Learning Commons, located in Pelletier Library (`http://sites.allegheny.edu/learningcommons/`). Among other things, the staff at the Learning Commons can assist you with study and time management skills, writing, and critical reading. You should know that if you are having trouble in this class, or if I think you can specifically benefit from their services, I will refer you to the Learning Commons. Experienced peer writing and speech consultants in the Learning Commons help writers and speakers to determine strategies for effective communication and to make academically responsible choices at any stage in the writing or speaking process and on assignments in any discipline. Both appointments and drop-in sessions are available. To view the hours of operation, and to make an appointment, visit the Learning Commons website.

Religious Accommodations
If you need to miss a class or reschedule a final examination due to religious observance, please speak to the instructor well in advance to make arrangements. See
`http://sites.allegheny.edu/religiouslife/religious-holy-days/`

Email and Slack
The instructor will primarily respond to the student queries through the course Slack channel and his Allegheny email account regularly. In general, you may expect the instructor to reply to your queries during weekdays.
Students who are struggling with the course material or who have questions should begin by posting their questions (unless a private concern) to the Slack channel so that the instructor or a fellow student may provide an answer within the bounds of the Honor Code.

Class Preparation
To minimize confusion and maximize learning, students must invest time to prepare for class discussions and lectures. During the class periods, the course instructor will often pose demanding questions that could require group discussion, the creation of a program or solving logical problems, a vote on a thought-provoking issue, or a group presentation. Only students who have prepared for class by reading the assigned material and reviewing the current assignments will be able to effectively participate in these discussions. More importantly, only prepared students will be able to acquire the knowledge and skills that are needed to be successful in both this course and the field of computer science. To help students remain organized and effectively prepare for classes, the course instructor will maintain a class schedule with reading assignments and presentation slides. During the class sessions, students will also be required to download, use, and modify programs and solutions to logical problems, that are made available

through the course instructor.

Academic Integrity
Allegheny College operates under an Honor Code, to which all students are subject. See The Compass: Student Handbook. You should educate yourself appropriately as to how this applies to you. Plagiarism and other forms of intellectual dishonesty will not be tolerated. All students enrolled at Allegheny College are bound by the Honor Code. It is expected that your behavior 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 elses 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 following 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, The Compass, and elsewhere.

Additionally, the Honor Committee co-chairs have requested that a signature, as well as the following phrasing, be included on all submissions of graded work:

> ”This work is mine unless otherwise cited.”

Structure of the Semester
In Table 2, a rough outline of the topics (at a high-level) covered this semester is provided. Some shifting in the schedule of topics is possible.

Lesson Topics	**Learning Objective**
Large Scale Computing	**Lo_1**
Data Collection Methods	**Lo_2**
Workflow Scheduling	**Lo_3**
Apache Hadoop	**Lo_4**

Table 2: Tentative Topic List for CMPSC 402, Fall 2020