DALHOUSIE UNIVERSITY
Faculty of Computer Science

CSCI-1234 --- Water Computer Systems
Course Syllabus

Instructor Information

Instructor:	Dr. Seuss	**Office:**	CS 123
E-mail:	drseuss@cs.dal.ca	**Office Hours:**	TBA
Class Meeting Time:	MWF 7:35-8:25	**Room No:**	CS 127
Lab Meeting Time	TR 7:35-8:25	**Room No:**	CS 134
Course Homepage:	https://dal.brightspace.com/		
Course Mail List:	all-cs1234@cs.dal.ca		

Important Dates

- Reading Week (no classes): February 21--25, 2112
- Midterm Exam: February 16, 2112
- Final Exam: TBA in the period of April 11 to 27, 2112
- Final Withdrawal Date without academic penalty: January 31, 2112
- Final Withdrawal Date with financial penalty: March 7, 2112
- Deadlines: Four assignments due at 5pm on January 21, February 11, March 11, and April 8.

Course Description

This course will discuss the concepts behind water computer systems. Students will be introduced to the design, implementation, and function of water computer systems. Topics include hydrostatics, hydrokinematics, and hydrodynamics of water computer systems; thermodynamics of water computer system; water computer architecture, solid state and liquid state memory systems, pipelining, and valve theory.

Students will get hands on experience in laying pipes, core-dump recovery, securing systems against flooding attacks, and performing basic administration. Students will also gain experience with flow graphs, and the Ohh programming language. Students are expected to get their hands wet in this course.

Learning Outcomes

- Explain why all three states of water are needed for hydrocomputation.
- Identify how containment is achieved in standard water computer models.
- Design inflow and outflow handlers for a simple water computer.
- Evaluate standard bucket management schemes by applying the Bucket Model.
- Implement bucket creation and composition in a simple water computer.
- Design a pipe and valve network for a simple hydrocomputation.
- Determine if overflows or underflows may occur in a simple water computer.
- Implement standard mechanisms for dealing with spillage and evaporation.
- Implement a solution to the Drinking Philosophers Problem.
- Implement the Bankers algorithm for Ice Trays.
- Implement a solution to issues dealing with freezing and thawing.

Class Format and Course Communication

- Content will be delivered via a combination of lectures and interactive group exercises
- Students will be expected to use the Top Hat Student Response System (http://app-ca.tophat.com/e/654475 or SMS: +1 647 931 6504)
- Students must ask the instructor permission before recording class lectures.
- Course announcements will be posted to the course mail list, which comprises the instructor's and students' Dal emails. It is the student's responsibility to check their Dal e-mail on a daily basis. To access your Dal e-mail see: https://www.dal.ca/dept/its/o365/services/email.html

Evaluation Criteria

- Assignments (30%)
  - Four assignments, each worth 7.5%
  - Late assignments will not be accepted.
  - Assignments must be submitted both in paper and electronically.
  - No collaboration is permitted on the assignments.
  - All assignments will be checked with the Rubber Gasket plagiarism detection software.
- Midterm Exam (20%)
  - To be held during class.
- Final Exam (50%)
  - The exam will be scheduled by the university.
  - The exam will cover all material in the course.

Notes

- As of 2015, a minimum grade of C must be achieved in all required CS courses.
- The grade conversion scale in Section 17.1 of the Academic Regulations, Undergraduate Calendar will be used.
- A student must pass (50%) both the assignment component and the final exam to pass the course.

Midterm and Final Exam Requirements

- Photo ID is required
- Closed book
- No dictionaries, notes, calculators, cell phones, PDAs, talking slide rulers, or other electronic aids allowed.

Required Texts and Resources

- The text for the course is: Steem R., Lickwid D., and Ayse E., "Water Computer System Concepts 1st ed.", Wiley, 2012, ISBN: 0741082270. Earlier editions are acceptable.
- The lecture slides will be posted on the learning management system (Brightspace).
- Students are required to sign up for a Top Hat Student Response System account http://app-ca.tophat.com/e/844288. Top Hat will be used in class to present questions and discussion topics that students can answer using their smartphones or electronic devices.
- Additional assistance is available from the Student Learning Centre (2nd floor, Goldberg CS Building).

Prerequisites

CSCI-1210, CSCI-1221, and CSCI-1232

Tentative List of Topics

- Overview [Lecture 1]
  - What is a Water Computer?
  - A Brief History of Hydrocomputing
  - The Three States of Water
- The Low Level [Lecture 2 – 6]
  - The Containment Problem
  - Inflow and Outflow Handling
  - Water Tables
- Buckets [Lecture 7- 11]
  - The Bucket Abstraction
  - Buckets and the Bucket Model
  - Bucket Composition and Creation
- Interbucket Flows [Lecture 12 – 16]
  - Pipes and Valves
  - Sluices and Aqueducts
  - Overflows and underflows
- Watershed Management [Lecture 17 – 20]
  - Spillage and Evaporation
  - Reservoirs
  - The Drinking Philosophers Problem
- Solid State Storage [Lecture 21 – 24]
  - The Ice Cube Abstraction
  - Ice Trays and Cube Extraction
  - Freezing and Thawing

Responsible Computing Policy

Usage of all computing resources in the Faculty of Computer Science must be within the Dalhousie Acceptable Use Policies (http://its.dal.ca/policies/) and the Faculty of Computer Science Responsible Computing Policy. For more information please see https://www.cs.dal.ca/downloads/fcs_policy_local.pdf

Use of Plagiarism Detection Software

All submitted code may be passed through a plagiarism detection software, such as the plagiarism detector embedded in Codio, the Moss (https://theory.stanford.edu/~aiken/moss/) Software Similarity Detection System, or similar systems. If a student does not wish to have their assignments passed through plagiarism detection software, they should contact the instructor for an alternative. Please note, that code not passed through plagiarism detection software will necessarily receive closer scrutiny. https://cdn.dal.ca/content/dam/dalhousie/pdf/dept/university_secretariat/policy-repository/OriginalitySoftwarePolicy.pdf

Copyright Notice

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Culture of Respect[1]

Every person has a right to respect and safety. We believe inclusiveness is fundamental to education and learning. Misogyny and other disrespectful behaviour in our classrooms, on our campus, on social media, and in our community is unacceptable. As a community, we must stand for equality and hold ourselves to a higher standard.

What we all need to do:

[1] Source: Speak Up! © 2005 Southern Poverty Law Center. First Printing. This publication was produced by Teaching Tolerance, a project of the Southern Poverty Law Center. Full "Speak Up" document found at: http://www.dal.ca/dept/dalrespect.html. Revised by Susan Holmes from a document provided April 2015 by Lyndsay Anderson, Manager, Student Dispute Resolution, Dalhousie University, 902.494.4140, lyndsay.anderson@dal.ca www.dal.ca/think.

1. **Be Ready to Act:** This starts with promising yourself to speak up to help prevent it from happening again. Whatever it takes, summon your courage to address the issue. Try to approach the issue with open-ended questions like "Why did you say that?" or "How did you develop that belief?"
2. **Identify the Behaviour:** Use reflective listening and avoid labeling, name-calling, or assigning blame to the person. Focus the conversation on the behaviour, not on the person. For example, "The comment you just made sounded racist, is that what you intended?" is a better approach than "You're a racist if you make comments like that."
3. A**ppeal to Principles:** This can work well if the person is known to you, like a friend, sibling, or co-worker. For example, "I have always thought of you as a fair-minded person, so it shocks me when I hear you say something like that."
4. **Set Limits:** You cannot control another person's actions, but you can control what happens in your space. Do not be afraid to ask someone "Please do not tell racist jokes in my presence anymore" or state "This classroom is not a place where I allow homophobia to occur." After you have set that expectation, make sure you consistently maintain it.
5. **Find or be an Ally:** Seek out like-minded people that support your views, and help support others in their challenges. Leading by example can be a powerful way to inspire others to do the same.
6. **Be Vigilant:** Change can happen slowly, but do not let this deter you. Stay prepared, keep speaking up, and do not let yourself be silenced.

University Statements

This course is governed by the academic rules and regulations set forth in the University Calendar and the Senate.
https://academiccalendar.dal.ca/Catalog/ViewCatalog.aspx?pageid=viewcatalog&catalogid=69&chapterid=3457&loaduseredits=False

Academic Integrity

At Dalhousie University, we are guided in all of our work by the values of academic integrity: honesty, trust, fairness, responsibility and respect (The Center for Academic Integrity, Duke University, 1999). As a student, you are required to demonstrate these values in all of the work you do. The University provides policies and procedures that every member of the university community is required to follow to ensure academic integrity. http://www.dal.ca/dept/university_secretariat/academic-integrity.html

Accessibility

The Advising and Access Services Centre is Dalhousie's centre of expertise for student accessibility and ac- commodation. The advising team works with students who request accommodation as a result of: a disability, religious obligation, or any barrier related to any other characteristic protected under Human Rights legislation (NS, NB, PEI, NFLD). http://www.dal.ca/campus_life/student_services/academic-support/accessibility.html

Student Code of Conduct

Everyone at Dalhousie is expected to treat others with dignity and respect. The Code of Student Conduct allows Dalhousie to take disciplinary action if students dont follow this community expectation. When appropriate, violations of the code can be resolved in a reasonable and informal mannerperhaps through a restorative justice process. If an informal resolution cant be reached, or would be inappropriate, procedures exist for formal dis- pute resolution.
https://www.dal.ca/dept/university_secretariat/policies/student-life/code-of-student-conduct.html
https://www.dal.ca/campus_life/safety-respect/student-rights-and-responsibilities/student-life-policies/code-of-student-conduct.html

Diversity and Inclusion – Culture of Respect

Every person at Dalhousie has a right to be respected and safe. We believe inclusiveness is fundamental to education. We stand for equality. Dalhousie is strengthened in our diversity. We are a respectful and inclusive community. We are committed to being a place where everyone feels welcome and supported, which is why our Strategic Direction prioritizes fostering a culture of diversity and inclusiveness (Strategic Priority 5.2). http://www.dal.ca/cultureofrespect.html

Recognition of Mikmaq Territory

Dalhousie University would like to acknowledge that the University is on Traditional Mikmaq Territory. The Elders in Residence program provides students with access to First Nations elders for guidance, counsel and support. Visit the office in the McCain Building (room 3037) or contact the programs at elders@dal.ca or 902-494-6803 (leave a message).

Learning and Support Resources

- General Academic Support — Advising
  http://www.dal.ca/campus_life/student_services/academic-support/advising.html
- Fair Dealing Guidelines
  https://libraries.dal.ca/services/copyright-office/guidelines/fair-dealing-guidelines.html
- Dalhousie University Library http://libraries.dal.ca/