The VIU community acknowledges and thanks the Snuneymuxw, Quw'utsun, Tla'amin, Snaw-naw-as and Qualicum First Nation on whose traditional lands we teach, learn, research, live and share knowledge.

Course Outline
CSCI 429

Advanced Topics in Algorithms and Complexity (3 credits)

CSCI 320 S25N01 and N02

September 2, 2025 – December 5, 2025 (VIU last day of Fall classes)

Calendar Description

This course examines selected emerging and advanced topics in Algorithms and Complexity Theory. Topics may include: advanced techniques for algorithm analysis; complexity classes; algorithmic techniques in graph theory, combinatorics, and optimization; approximation algorithms; distributed and parallel algorithms; probabilistic algorithms; online algorithms; quantum algorithms. May be taken more than once in different topics with permission of Department Chair. CSCI 429 was formerly called CSCI 485C; credit will not be granted for both courses. (3:0:2)

Course Description

THE ATTENDANCE POLICY:
Attendance in the lecture and lab will be taken, for the purpose of understanding student performance.

Students are responsible for receipt of announcements made in person in class. Students are responsible for material covered in class.

Delivery Mode

Face-to-face.

Contact hours

3 hours lecture & 2 hours seminar per week

Prerequisites and Corequisites

Min. "C" in CSCI 260 and CSCI 320.

Proposed Schedule

Lecture:	Tue, Thu, 10:00-11:30
Seminar:	Tue 12:30-2:30

Instructor Info

Instructor name:	Gara Pruesse
Instructor VIU email address:	Gara.Pruesse@viu.ca
Office Hours:	Mon 9:00-10:30, and on Fridays by appointment
Office:	315-218

Learning Outcomes

By the end of this course students will have a deeper knowledge of algorithm development, selection and analysis through the exploration of a range of topics, possibly including but not limited to:

- Advanced topics in complexity analysis
  - Amortized analysis
  - Approximation analysis
- Advanced topics in Data Structures and Algorithms
  - Fibonacci Heaps
  - Network Flow algorithms
  - Graph Algorithms
  - Greedy Algorithms
  - Range minima
  - Dynamic Programming
  - Approximation Algorithms
  - Scheduling Algorithms

Course Learning Materials

Textbook:

There is no required textbook. Materials will be identified as the course progresses.

Evaluation and Assessment

- **Midterms and Quizzes**
  Two midterms worth 22.5% each; dates To Be Determined.
- **Final Project**
  In addition, there will be a final project worth 35%, inclusive of a final presentation. Intermediate documents are also required.
- **Quizzes, Programming Assignments, Problem Sets, and Solution Presentations**

  The remaining 20% of the grade will be derived from programming assignments, problem sets, and quizzes. Certain problems may be identified for student presentation. These will be graded and will be worth relatively more than submitted work.
- Paper problem sets will be accepted in person. Students may also hand in assignments in electronic form if they are **not** scans of handwritten work.
  Scans of handwritten assignments will not be graded, but will be permitted as proof of completion by the deadline as long as the physical original is handed in on or before the first workday after the assignment is due.
  Problem sets will have a specified due date, and any assignments handed in after the due date, within 24 hours, will have 10% penalty. After 24 hours it will not be accepted.
- **Submitting AI-influenced work**

  The Instructor is not expected to grade AI-generated work. Work that is the student's own work must be identified as such in order to be graded. Students must record and submit their AI prompts, and the AI's response.
- **Policy on Re-Grading**
  Any assignment, quiz, or examination grade may be appealed. The instructor reserves the right to re-grade the entire piece of work submitted on appeal, not necessarily just the component that the student believes is in error.
  Note that a request for clarification does not, in itself, constitute an appeal. In fact, students are encouraged seek such clarification when they do not understand why they have been assigned a particular grade - this often results in a learning opportunity for both the student and the instructor.

Grades will be distributed as follows:

A+ >= 90.0	A >= 85.0	A- >= 80.0
B+ >= 76.0	B >= 72.0	B- >= 68.0
C+ >= 64.0	C >= 60.0	C->= 55.0
D >= 50.0		F otherwise

Course not completed due to unofficial withdrawal. UW

An incomplete Grade form is required to support an "I" grade.

Resources

- Department of Computer Science
- VIULearn
- Library
- Academic Advising
- Writing Centre
- Math Learning Centre
- Services for Aboriginal Students
- Counseling Services
- Accessibility
- Registration
- VIU Students' Union

Accessibility

Vancouver Island University recognizes its legal duty to provide educational opportunities that enable students with a documented disability to access courses, programs, facilities, and services.

The Policy and Procedural Guidelines apply to all students who have identified themselves to the institution as having a documented disability who are inquiring about, applying to, or registered in credit or non-credit courses in both on and off-campus programs.

- Policy 32.02 - Services Available to Students with a Documented Disability

Academic Integrity

Integrity in academic work is a central element of learning and is the basis of intellectual pursuits in any academic community. It is also your responsibility to abide by the Student Conduct Code and Student Academic Code of Conduct.

- Academic Integrity

About Academic Integrity

- DO talk to your classmates about problems, even Assignment problems
- DO work in groups at a whiteboard
- DO read published solutions to similar problems to get ideas

- DO feel free to help your classmates to understand, if asked
- DO NOT copy any work not original to you without the appropriate reference (including web location, doi, page number, author, title, date, etc) and including quotation marks or indenting to mark exact text.
- If you copy code, you must do so in a manner that does not violate copyright, and you must reference the source in sufficient detail and, if the code is amended, use commenting in the code to unambiguously identify every line of code that is not authored by you.
- Submitting any assignment or homework question to an AI process is a violation of the instructor's or the text author's intellectual property rights, and you are prohibited from such violation.
- The use of AI systems like ChatGPT is up to the student, subject to the above-mentioned prohibition to entering the text of the problem authored by the instructor into an AI and all pertinent laws and principles of fair-use. If AI is utilized as a tool for solutions to algorithmic or programming problems, the student is expected to apply the same rigour and accountability that would accord to the use of AI in the workplace. It is the responsibility of the student to subject all solutions provided by an AI to rigorous testing, and the student should understand and defend the solution and be able to teach it to others.

Links to University Policies, Standards, and Guidelines

- University Policies
- Freedom of Information and Protection of Privacy
- Student Conduct and Care (SCC)
- Student Academic Code of Conduct
- Student Affairs
- Academic Regulations
- Equity, Diversity, and Inclusion (EDI)