

**Course Syllabus**  
**CP 264: Data Structure II**

Department of Physics and Computer Science  
Fall 2019

*I acknowledge that in Kitchener, Waterloo, Cambridge and Brantford we are on the traditional territory of the Neutral, Anishnawbe, and Haudenosaunee peoples.*

**Instructor Information**

Instructor: Masoomah Rudafshani  
Office: N2086 (Science building, second floor)  
Email: [mrudafshani@wlu.ca](mailto:mrudafshani@wlu.ca)  
Phone:

**Lab Instructor**

Name: Rick Magnotta  
Office: N2091 (Science building, second floor)  
Email: [rmagnotta@wlu.ca](mailto:rmagnotta@wlu.ca)  
Phone: X 2799

**Course Information**

This course covers some of general-purpose data structure and their applications in C. Topics include an introduction to the C language; time complexity analysis; data structures (arrays, stacks, queues, lists, trees, heaps, hash tables, and graphs); sorting and searching; memory allocation and management; testing and debugging; writing efficient programs.

<b>Class Schedule</b>	MWF 2:30 p.m. - 3:20 p.m.
<b>Class Location</b>	Bricker Academic Building BA 111
<b>Pre-requisites</b>	CP 164: Data Structure I
<b>Office Hours</b>	Wednesday: 1:30 p.m. - 2:30 p.m.
<b>Lab Schedule and location</b>	Lab1: Wednesday 8:30 AM - 9:20 AM Lab2: Friday 11:00 AM - 11:50 AM

**Course Overview and Approach**

The course provides an introduction to the C programming language. The objectives of this course are:

- To learn and practice how to implement already known control structures in C
- To learn and implement fundamental data structures in C
- To learn and practice developing efficient C code
- To learn and practice debugging C programs

The students meet the objectives of the course by participating and following through the assigned tasks. Lecture slides will be used to present the contents of the course. In select-class learning activities will be organized by the instructor and preparation activities will be assigned before-hand. Therefore, the students are expected to come prepared to each class. The students are encouraged to attend the office hours and use the discussion group created on MLS to find answers to their questions.

### Course Goals and Learning Outcomes

By the end of this course students should be able to:

- Obtain beginning proficiency in C programming.
- Describe the properties and operations of basic data structures.
- State the runtime complexity of the operations on various data structures.
- Analyze the time complexity of an algorithm or program code in C.
- State the space utilization of common data structures.
- Compare the operation of common data structures in terms of time complexity and space utilization.

### Course Tools and Learning Materials

- All the course materials, information, and assignments will be posted on MyLearningSpace: Laurier's MyLearningSpace [course login page](#).
- **Textbook (Required)**
  - Zybooks: Programming in C and Data structures Essentials.
    - This book is a combination of two books offered by Zybooks. The textbook is available in digital format under the title: *CP264: Data Structures II*. This book will be used for doing class preparation and class activities.
    - To get a copy of the textbook, you need to do the following:
      1. Sign in or create an account at [learn.zybooks.com](http://learn.zybooks.com)
      2. Enter zyBook code: WLUCP264RudafshaniFall2019
      3. Subscribe
- **Recommended textbooks (optional):**
  - The C Programming Language, Kernighan & Ritchie, Prentice-Hall, 2nd ed, 1988
- **Lecture slides/notes** are provided by the instructor for each week and will be posted on MLS.
- **Discussion group:** A discussion group will be created on MyLearningSpace, so students can discuss technical questions related to the course/assignments over there.

## Student Evaluation

Assessment	Weighting
Assignments	20%
class participations and class activities	10%
zyBook	10%
Labs	10%
Midterms	20%
Final Exam	30%
<b>Total</b>	<b>100%</b>

## Course Passing Requirement

In order to pass the course, students should get half of the maximum point in each of assignments, midterms and final exam.

Final letter grades are assigned by using the standard university grading scheme:

A+	A	A-	B+	B	B-
90-100	85-89	80-84	77-79	73-77	70-72

C+	C	C-	D+	D	D-	F
67-69	63-66	60-62	57-59	53-56	50-52	0-49

## Assignments:

To learn the concepts taught throughout the course, the students have to do all the assignments:

- **Submitting Assignments:** Each assignment should be prepared and submitted according to the instructions provided by the instructor. The assignments are posted on MLS along with the instructions.
- **Late Assignment Policy:** All the assignments are due on the date and time specified by the instructor. For the entire semester, you have five free "late days". It is strongly advised to save them for emergencies. You may not use more than two for the same assignment. If you do not have any remaining late days, assignments are accepted with a 20% of the assignment's maximum points per day late.
- If you have any question or concern regarding the grading of your assignment you must contact the course instructor **within one week** after the graded assignment is made available to you (not at the end of the term).
- Assignments should be done **individually**. Refer to university policy on plagiarism mentioned in the rest of this document.

## Class Participation and class activities

- Attendance are not checked in each session. However, you are responsible for all the material covered in class.

- in-class learning activities and/or iClickers are done throughout the semester. These activities are graded and contribute towards 10% of your final mark.

### ZyBook

- To be prepared for the activities in class, the students are assigned preparation activities. In addition, to get a deeper understanding of the concepts covered in the course, reading activities are assigned. The preparation/reading activities are assigned from zyBook textbook.

### Labs

- To practice the concepts taught in the course the students are doing one 50-minute lab session every week.
- Lab tasks are available on the following link: <https://bohr.wlu.ca/cp264/labs/>
- The labs start on the second week of classes. The first lab will be running on September 11th.
- If you have any question that is related to the lab material or grades please contact the lab instructor.

### Exams

There are three exams in this course: one final exam and two (in-class) midterm exams.

- In order to pass the course, a student needs to get at least 50% in each exam.
- The exams are closed books.
- The midterm exams are done in class (online exams through mylearningspace).

### Tentative Weekly Schedule

Week #	Day	Date	Topic/ Unit of Study	Labs	Assignments Due dates
Week 0	Fri	Sep. 6	Introduction		
Week 1	Mon	Sep. 9	C basics, program structure, syntax, preprocessor, compiling		
	Wed	Sep. 11	primary data types, variables and constants, operators and expression, Input/Output using <code>getchar</code> and <code>putchar</code>	Lab1: C environment: compile and run C programs/ passing arguments	
	Fri	Sep. 13	Statements and Control statements Conditional, loops ( <code>while</code> , <code>do..while</code> , <code>for</code> , <code>break</code> , <code>continue</code> , <code>go</code> )		

			header files		
Week 2	Mon	Sep. 16	Pointers Arrays Dynamic memory allocation		
	Wed	Sep. 18	multidimensional arrays, function pointers	Lab2: Debugging c programs in Eclipse, C Basics, pointers, arrays	
	Fri	Sep. 20	Strings		Assignment 1: C Basic, arrays, pointers, function pointers
Week 3	Mon	Sep. 23	Structured data types (structs, unions, enumeration)		
	Wed	Sep. 25	File I/O	Lab 3: strings, functions	
	Fri	Sep. 27	File I/O recursion		Assignment 2: strings, structured data types,
Week 4	Mon	Sep. 30	Data structures: Asymptotic notations Linked list		
	Wed	Oct. 2	stack, queue (linked list)	Lab4: files, header files	
	Fri	Oct. 4	stack, queue		Assignment 3: file I/O,
Week 5	Mon	Oct. 7	Trees		
	Wed	Oct. 9	<b>Midterm</b>	Lab5: Linked Structures	
	Fri	Oct. 11	Binary Trees		Assignment 4: Linked lists
Week 6 Reading Week	Mon.	Oct. 14	No Class		
	Wed.	Oct. 16			
	Fri.	Oct. 18			
Week 7	Mon.	Oct. 21	Binary search trees		
	Wed.	Oct. 23	Balanced BSTs: AVL Tree, Red black tree, etc.	Lab6: trees, BST	Assignment 5: Trees, BST
	Fri.	Oct. 25	Balanced BSTs		
Week 8	Mon.	Oct. 28	heap,		

	Wed.	Oct. 30	binary heaps	Lab7: Balanced trees	
	Fri.	Nov. 1	binomial heap		Assignment 6: Balanced trees
Week 9	Mon.	Nov. 4	Fibonacci heap		
	Wed.	Nov. 6	hash tables	Lab8: heaps	
	Fri.	Nov. 8	hash tables		Assignment 7: heaps
Week 10	Mon.	Nov. 11	sorting		
	Wed.	Nov. 13	<b>Midterm</b>	Lab9: hash tables	
	Fri.	Nov. 15	sorting		Assignment 8: hash tables
Week 11	Mon.	Nov. 18	macros		
	Wed.	Nov. 20	graph	Lab10: sorting	
	Fri.	Nov. 22	graph		Assignment 9: sorting
Week 12	Mon.	Nov. 25	graph		
	Wed.	Nov. 27	Prim's algorithm implementation with heap	Lab 11: graphs	
	Fri.	Nov. 29	Dijkstra algorithm		Assignment 10: graph data structure
Week 13	Mon.	Dec. 2	What's next? C++		
	Wed.	Dec. 4	Final exam review		

### University and Course Policies

- 1. Academic Calendars:** Students are encouraged to review the [Academic Calendar](#) for information regarding all important dates, deadlines, and services available on campus.
- 2. Special Needs:** Students with disabilities or special needs are advised to contact Laurier's Accessible Learning Centre for information regarding its services and resources.
- 3. Classroom Use of Electronic Devices:** Cell phones must be turned off /silent mode (buzzer is off) during class time – see [Policy 9.3](#) (Approved by Senate March 8, 2012).
- 4. Final Examinations:** There is no final exam in this course

5. In every email correspondence with the instructor, put the class number **CP 467** and a brief summary of your message in your email subject: e.g., Subject: CS467 A question on HTML
  
6. **Plagiarism:** Wilfrid Laurier University uses software that can check for plagiarism. If requested to do so by the instructor, students are required to submit their written work in electronic form and have it checked for plagiarism. (Approved by Senate May 14, 2002) .

**Academic Integrity:** Laurier is committed to a culture of integrity within and beyond the classroom. This culture values trustworthiness (i.e., honesty, integrity, reliability), fairness, caring, respect, responsibility and citizenship. Together, we have a shared responsibility to uphold this culture in our academic and nonacademic behaviour. The University has a defined policy with respect to academic misconduct. As a Laurier student you are responsible for familiarizing yourself with this policy and the accompanying penalty guidelines, some of which may appear on your transcript if there is a finding of misconduct. The relevant policy can be found at Laurier's [academic integrity](#) website along with resources to educate and support you in upholding a culture of integrity. Ignorance is not a defense.

#### **University Resources:**

- Good2Talk is a postsecondary school helpline that provides free, professional and confidential counselling support for students in Ontario. Call 1-866-925-5454 or through 2-1-1. Available 24-7.
  
- [Waterloo Student Food Bank](#): All students are eligible to use this service to ensure they're eating healthy when overwhelmed, stressed or financially strained. Anonymously request a package online 24-7. All dietary restrictions accommodated.
  
- [Waterloo Foot Patrol](#): 519.886.FOOT (3668). A volunteer operated safe-walk program, available Fall and Winter daily from 6:30 pm to 3 am. Teams of two are assigned to escort students to and from campus by foot or by van.
  
- [Waterloo Student Wellness Centre](#): 519-884-0710, x3146. The Centre supports the physical, emotional, and mental health needs of students. Located on the 2<sup>nd</sup> floor of the Student Services Building, booked and same-day appointments are available Mondays and Wednesdays from 8:30 am to 7:30 pm, and Tuesdays, Thursdays and Fridays from 8:30 am to 4:15 pm. Contact the Centre at x3146, [wellness@wlu.ca](mailto:wellness@wlu.ca) or @LaurierWellness. After hours crisis support available 24/7. Call 1-844-437-3247 (HERE247).