COMPUTER SCIENCE 1027a

COMPUTER SCIENCE FUNDAMENTALS II

Instructors:

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(for Computer Science students)

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(for Engineering students)
What is CS1027 about?

Main focus:

- The design of algorithms
- The organization and manipulation of data.

Choosing how to organize data into collections such as

- stacks
- queues
- lists
- trees
A Stack of Plates

New plate is added at the top of the stack, and will be the first one removed.
A Queue of People

First person served will be the one at the front of queue

New person is added to the rear of the queue
A List of Numbers

This is an example of an Ordered List, so a new number must be added such that the numbers remain in order.
What is CS1027 about?

Collections
(or Abstract Data Types)

- What would we use them for?
- Why would we use them?
- How are they implemented?
...What is CS1027 about?

plus:

- Sorting and searching techniques
- Analysis of algorithms
- Recursion *(methods calling themselves)*

and, continuing from CS1025 / 1026:

- Good object-oriented design
- Good programming practices
• Programming will be done in *Java*
• The Java computing environment for CS1027 is *Eclipse*
Should you be here?

• **Prerequisite:**
  Comp Sci 1025a/b or 1026a/b

• **You should be comfortable with programming syntax in Python or Java.**

• **Note:** “Unless you have either the prerequisite for this course or written special permission from your Dean to enroll in it, you will be removed from this course and it will be deleted from your record. This decision can not be appealed. You will receive no adjustment to your fees.” Instructor Permission is also acceptable
COURSE TOPICS

• Revisit Object-Oriented programming
• Object-Oriented design concepts: *inheritance*
• Abstract data types and their implementations: *stacks, queues, lists, trees*
• Recursion
• Analysis of algorithms
• Sorting and searching techniques
Textbook


- There is a copy on 1-day reserve in the Taylor Library (NatSci building)
- The bookstore may have some copies for sale.
ADMINISTRATIVE DETAILS

Java Reference Books

- The Java Programming Language, Arnold, Gosling
- Java, an Object Oriented Approach, Arnow and Weiss
- Java how to Program, Deitel and Deitel
- Core Java, Cornell and Horstmann
- The Java Tutorials website: http://docs.oracle.com/javase/tutorial
**CS 1027a Website**

- Course webpage: http://www.csd.uwo.ca/courses/CS1027a
- Contains course related information:
  - Lecture notes
  - Lab instructions
  - Assignments
  - Links to other sites
  - Sample code
- *Check it frequently for announcements*
Lecture Notes

• Available from the CS1027a website
• They are intended to help in note-taking during lectures
• They are **NOT** a substitute for attending lectures
• There may be other material presented in lectures also
Textbook Code

• We will discuss code samples in class
  • They will be available on the CS1027a website or OWL.
• It may help you to have paper copies of the sample code in class.
Labs

- 1 lab hour per week
- Labs start on **Monday, September 9, 2019**
- Labs are mandatory and constitute 10% of your overall grade.
- Purpose of labs: to introduce or expand on practical material + programming exercises
- Lab instructions will be posted on the course website
  - Read through the lab instructions before going to the lab.
  - Do the pre-lab preparation.
  - No makeup labs (see course outline for more details)
Computing Facilities

The General Computing Labs across campus can be used for the required programming in this course or

You can use your laptop/desktop to do required coding for this course, but make sure your code runs on our computing environment.

Using eclipse gives you such a suitable environment!

By using your uwo account, you agree to abide by the Department's Rules of Ethical Conduct
Email contact

**Email from me to you:**
- Course email will be sent to your *uwo* email accounts
- You are responsible for information sent via email to your account
- See caveats in Course Outline re: forwarding email and mailboxes filling up

**Email from you to me:**
- Feel free to email me with *brief* questions re. lecture material or clarification of assignments
- Send email from your *uwo* account
- Please include “*CS1027*” in the Subject line
- Please use plaintext format
## Student Evaluation

<table>
<thead>
<tr>
<th></th>
<th>Weight</th>
<th>Due Date (tentative)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assignment 1</td>
<td>9%</td>
<td>September 27(^{th})</td>
</tr>
<tr>
<td>Assignment 2</td>
<td>9%</td>
<td>October 18(^{th})</td>
</tr>
<tr>
<td>Assignment 3</td>
<td>9%</td>
<td>November 15(^{th})</td>
</tr>
<tr>
<td>Assignment 4</td>
<td>8%</td>
<td>December 3(^{rd})</td>
</tr>
<tr>
<td>Labs</td>
<td>10%</td>
<td>Weekly</td>
</tr>
<tr>
<td>Quizzes</td>
<td>5%</td>
<td>Every 2-3 weeks</td>
</tr>
<tr>
<td>Midterm Exam</td>
<td>20%</td>
<td>October 26(^{th}) 7pm-9pm</td>
</tr>
<tr>
<td>Final Exam</td>
<td>30%</td>
<td>TBA</td>
</tr>
</tbody>
</table>

All assignments are due at 11:55 pm.
Important Conditions

To pass the course:
- Weighted average of exams must be at least 45%
- Weighted average of assignments must be at least 45%
- Otherwise your maximum course grade is 45%

To achieve a final grade of 65% or higher:
- Weighted average of exams must be at least 50%
- Weighted average of assignments must be at least 50%
- Otherwise your maximum course grade is 60%
Student Evaluation

If for any reason an assignment has to be cancelled, the weights of the other assignments will be prorated to add up to 35%.

If for any reason the midterm exam has to be Cancelled, the final exam will be worth 50% of the final mark.

If your final exam grade is higher than your midterm grade, the final exam grade will count for your full exam grade.
Midterm Exam

Saturday, October 26\textsuperscript{th}, 7:00pm-9:00pm
Locations: NCB-114, NCB-117, and NCB-293

- There is \textit{no} makeup midterm exam, except for students requesting a Special Midterm Exam for religious reasons (must request a Special Midterm Exam \textit{and} file documentation with their Dean’s office at least \textit{two weeks} before the midterm exam date)
- If you miss the Midterm Exam for any other reason, your final exam grade will count for the full 50% exam grade.
- More information will come closer to that time.
Programming Assignments

Assignment Submission: details will be posted on our website

Late Assignments:
• Late penalty is 10% of the max. assignment mark per day late
• Weekend counts as 1 day regarding lateness
• Maximum two days late
• No extensions given
• In cases of lengthy illness etc. take documentation to your Dean’s office
Assignment Marking

• Your assignments may be prepared on a computing system other than those of the Department. However, programs will be marked by teaching assistants on the equipment of the Department.
• There is a 2 week time limit on requesting adjustment in an assignment mark.
Assignment Marking

• For questions regarding an assignment mark, you must first contact and discuss your concerns with your teaching assistant. If the matter remains unresolved, you may then take your concerns with your course instructor.

• Keep a duplicate copy of all your assignments, just in case … Keep these copies until the end of the course.
Ethical Conduct

- Assignments are to be completed by *individuals*, not pairs or groups
- Discussing approaches to problems is OK, but writing code that looks the same is not!
- *Collaboration that results in assignments that are more than coincidentally alike is unacceptable and will be regarded as an occurrence of academic dishonesty.*
Ethical Conduct

We have sophisticated software in place that will examine your code against everyone else in both sections and report any incidents of copying.
What is academic dishonesty?

- Collaboration
- Copying another student's assignment
- Allowing another student to copy
- Using code from books, the Internet, etc. (without citation)
- Paying someone to write your code

*Penalty for academic dishonesty:* reported to Dean, penalty starts at 0% plus a penalty equal to weight of the assignment
Java vs Python

- 1026 uses Python so why are we switching to Java?
- 4/5 TOP used programming languages are statically typed (Python is dynamically typed)
- Java allows us to look more under the hood to see how things are done
- Java is much faster than Python
- For example: how are lists dynamically expanded in Python?
Java vs Python

A classic example in both Python and Java

Java:

```java
public class HelloWorld {
    public static void main(String[] args) {
        System.out.println("Hello World");
    }
}
```

Python:

```python
print("Hello World")
```

What is public? What is class? What is static? What is void? What is String[] args?

Python allows us to teach concepts without losing students in syntax
## Java vs Python

**Speed?**  
Source: [http://benchmarksgame.alioth.debian.org/](http://benchmarksgame.alioth.debian.org/)

<table>
<thead>
<tr>
<th>Program</th>
<th>Java</th>
<th>Python</th>
</tr>
</thead>
<tbody>
<tr>
<td>Generate Pi Digits to 10000</td>
<td>3.12 seconds</td>
<td>2.20 seconds</td>
</tr>
<tr>
<td>Binary Tree stress test</td>
<td>5.75 seconds</td>
<td>152.06 seconds</td>
</tr>
<tr>
<td>n-body simulation</td>
<td>22.66 seconds</td>
<td>923.74 seconds</td>
</tr>
</tbody>
</table>