1. **Course:** CPSC 355: Computing Machinery I  
   **Lecture Sections:**  
   L01, MWF 9:00-9:50, Leonard Manzara, ICT 703, 220-3518, manzara@cpsc.ucalgary.ca  
   Office Hours: MWF 10:00-11:00  
   **Course Website:** D2L  
   Computer Science Department Office, ICT 602, 220-6015, cpsc@cpsc.ucalgary.ca  

2. **Prerequisites:** One of CPSC 219, 233 or 235.  
   (http://www.ucalgary.ca/pubs/calendar/current/computer-science.html#3620)  

3. **Grading:** The University policy on grading and related matters is described in sections F.1 and F.2 of the online University Calendar. In determining the overall grade in the course the following weights will be used:  
<table>
<thead>
<tr>
<th>Component</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assignments</td>
<td>30%</td>
</tr>
<tr>
<td>Midterm Exam</td>
<td>30%</td>
</tr>
<tr>
<td>Final Exam</td>
<td>40%</td>
</tr>
</tbody>
</table>
   *(In-Class Wednesday March 9th, 2016)*  

   This course will have a Registrar's Scheduled Final Exam.  

   **Special Regulations affecting the Final Grade (e.g. requirement to pass the final examination or to pass the laboratory to pass the course):** Each of the above components will be given a percentage grade. The final grade will be calculated using the weights given above and then converted to a final letter grade using the table given below. **To achieve an overall grade of C- or better in the course, you must achieve a minimum grade of C- or better in the final exam and complete all assignments.**  

4. **Missed Components of Term Work:** The regulations of the Faculty of Science pertaining to this matter are found in the Faculty of Science area of the Calendar. Section 3.6. It is the student's responsibility to familiarize themselves with these regulations. See also Section E.6 of the University calendar.  

5. **Scheduled Out-of-Class Activities:** REGULARLY SCHEDULED CLASSES HAVE PRECEDENCE OVER ANY OUT-OF-CLASS-TIME ACTIVITY. If you have a clash with this out-of-class activity, please inform your instructor as soon as possible so that alternative assignments can be arranged.  

6. **Course Materials:**  
   SPARC Architecture, Assembly Language Programming & C, Richard Paul, Prentice Hall (Required)  
   The C Programming Language, Brian Kernighan & Dennis Ritchie, Prentice Hall (Required)  
   **Online Course Components:** None.  

7. **Examination Policy:** Closed book. No aids allowed. Students should also read the Calendar, Section G, on examinations.  

8. **Approved Mandatory and Optional Course Supplemental Fees:** None.
9. **Writing across the Curriculum Statement:** In this course, the quality of the student’s writing in the weighted components of the course will be a factor in the evaluation of these components. See also Section E.2 of the University Calendar.

10. **Human Studies Statement:** Students will be expected to participate as subjects or participants in projects. See also Section E.5 of the University Calendar.

11. **OTHER IMPORTANT INFORMATION FOR STUDENTS:**

   a) **Misconduct:** Academic misconduct (cheating, plagiarism, or any other form) is a very serious offense that will be dealt with rigorously in all cases. A single offence may lead to disciplinary probation or suspension or expulsion. The Faculty of Science follows a zero tolerance policy regarding dishonesty. Please read the sections of the University Calendar under Section K, Student Misconduct to inform yourself of definitions, processes and penalties.

   b) **Assembly Points:** In case of emergency during class time, be sure to FAMILIARIZE YOURSELF with the information on assembly points which can be found in each classroom and building.

   c) **Student Accommodations:** Students needing an Accommodation because of a Disability or medical condition should contact Student Accessibility Services in accordance with the Procedure for Accommodations for Students with Disabilities available at [http://www.ucalgary.ca/policies/files/policies/procedure-for-accommodations-for-students-with-disabilities_0.pdf](http://www.ucalgary.ca/policies/files/policies/procedure-for-accommodations-for-students-with-disabilities_0.pdf). Students needing an Accommodation in relation to their coursework or to fulfil requirements for a graduate degree, based on a Protected Ground other than Disability, should communicate this need, preferably in writing, to the Associate Head of Computer Science, Dr. Ben Stephenson, by email bdstephe@ucalgary.ca or phone 403-220-6781.

   d) **Safewalk:** Campus Security will escort individuals day or night ([http://www.ucalgary.ca/security/safewalk/](http://www.ucalgary.ca/security/safewalk/)). Call 403-220-5333 for assistance. Use any campus phone, emergency phone or the yellow phones located at most parking lot pay booths.

   e) **Freedom of Information and Privacy:** This course is conducted in accordance with the Freedom of Information and Protection of Privacy Act (FOIPP). As one consequence, students should identify themselves on all written work by placing their name on the front page and their ID number on each subsequent page. For more information see also [http://www.ucalgary.ca/secretariat/privacy](http://www.ucalgary.ca/secretariat/privacy)

   f) **Student Union Information:** VP Academic (403) 220-3911 suvpaca@ucalgary.ca SU Faculty Rep (403) 220-3913 science1@su.ucalgary.ca, science2@su.ucalgary.ca and science3@su.ucalgary.ca. Student Ombuds Office: (403) 220-6420 ombuds@ucalgary.ca, [http://ucalgary.ca/provost/students/ombuds](http://ucalgary.ca/provost/students/ombuds)

   g) **Internet and Electronic Device Information:** You can assume that in all classes that you attend your cell phone should be turned off unless instructed otherwise. All communications with other individuals via laptop computers, cell phones or other devices connectable to the internet in not allowed during class time unless specifically permitted by the instructor. If you violate this policy you may be asked to leave the classroom. Repeated abuse may result in a charge of misconduct.

   h) **U.S.R.I.:** At the University of Calgary feedback provided by students through the Universal Student ratings of Instruction (USRI) survey provides valuable information to help with evaluating instruction, enhancing learning and teaching, and selecting courses ([www.ucalgary.ca/usri](http://www.ucalgary.ca/usri)). Your responses make a difference – please participate in USRI surveys.

Department Approval__________________________________________ Date__________________________

*A signed copy of this document is kept on file in the Computer Science Main Office ICT 602*
<table>
<thead>
<tr>
<th>Grade</th>
<th>Percentage Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>A+</td>
<td>95-100</td>
</tr>
<tr>
<td>A</td>
<td>90-94</td>
</tr>
<tr>
<td>A-</td>
<td>85-89</td>
</tr>
<tr>
<td>B+</td>
<td>80-84</td>
</tr>
<tr>
<td>B</td>
<td>75-79</td>
</tr>
<tr>
<td>B-</td>
<td>70-74</td>
</tr>
<tr>
<td>C+</td>
<td>65-69</td>
</tr>
<tr>
<td>C</td>
<td>60-64</td>
</tr>
<tr>
<td>C-</td>
<td>55-59</td>
</tr>
<tr>
<td>D+</td>
<td>50-54</td>
</tr>
<tr>
<td>D</td>
<td>45-49</td>
</tr>
<tr>
<td>F</td>
<td>0-44</td>
</tr>
</tbody>
</table>
Introduction
Course Objectives

Computer Architectures and Assembly Language Programming
Basic Computer Architectures
High-Level Architecture
CPU
System Clock
Random Access Memory
Bus
Secondary Memory
Peripheral Devices
Basic CPU Architectures
Instruction Cycle
Assembly Language Programming
Assemblers
Macro Preprocessors

SPARC Architecture
Introduction
Registers
SPARC Assembly Language Programming
Pipelining
Delay Slots
The gdb Debugger
Branching
Loops
If Construct
If-Else Construct

Digital Logic and Binary Numbers
Review of:
Binary Hardware Devices
Decimal Numbers
Binary Numbers
Octal Numbers
Hexadecimal Numbers
ASCII Characters
Bitwise Logical Instructions

Binary Arithmetic
Addition
Modulus Arithmetic
Subtraction
Signed Number Branching Conditions
Unsigned Arithmetic
Unsigned Number Branching Conditions
Condition Code Tests
Shift Instructions
Multiplication
Division
Extended Precision Arithmetic

The Stack
Memory and Memory Addressing
Stack Memory
The Stack and Frame Pointers
Addressing Stack Variables
Stack Variable Offsets
One-Dimensional Arrays

Data Structures
Multidimensional Arrays
Structures
Nested Structures

Subroutines
Introduction
Open (Inline) Subroutines
Register Saving
Subroutine Linkage
Arguments to Subroutines
Return Values
Subroutines with Many Arguments
Leaf Subroutines
Pointer Arguments

External Data and Text
Introduction
External Variables
The text and data Sections
ASCII Data
External Arrays of Pointers
The .bss Section
Relocation and Linking
Command Line Arguments

Input and Output
Brief Overview of:
Memory Mapped I/O
Character Devices
Programmed I/O
Interrupt-Driven I/O
System I/O

Floating-Point Numbers
Introduction
Fixed-Point Numbers
Floating-Point Single Format
The Floating-Point Unit
Floating-Point NaNs
Extended Precision Formats
Functions Calls

Machine Instructions
Introduction
Instruction Decoding
Format Three Instructions
Format One (call) Instruction
Format Two Instructions
Loading 32-bit Constants
### CPSC 355 Schedule

*(Subject to Change)*

<table>
<thead>
<tr>
<th>Week</th>
<th>Lecture Topics</th>
<th>Assignment Due</th>
<th>Exams</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Introduction, Computer Architectures</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>SPARC Architecture</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Digital Logic and Binary Numbers</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>Binary Arithmetic</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>The Stack</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>6</td>
<td>Data Structures</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Subroutines</td>
<td></td>
<td>3</td>
</tr>
</tbody>
</table>

*March 9*

8     | Subroutines                                         |                |        |
9     | External Data and Text                              |                | 4      |
10    | External Data and Text                              |                |        |
11    | Input and Output                                    |                | 5      |
12    | Floating-Point Numbers                              |                |        |
13    | Machine Instructions, Review                        |                | 6      |

*April 16 – 27*

<table>
<thead>
<tr>
<th>Important Dates</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Monday, Jan 11</td>
<td>Lectures start</td>
</tr>
<tr>
<td>Monday, Jan 18</td>
<td>Tutorials start</td>
</tr>
<tr>
<td>Friday, Jan 29, 4 pm</td>
<td>Assignment 1 due</td>
</tr>
<tr>
<td>Friday, Feb 12, 4 pm</td>
<td>Assignment 2 due</td>
</tr>
<tr>
<td>Monday, Feb 15 – Friday, Feb 19</td>
<td>Reading Week: no classes</td>
</tr>
<tr>
<td>Friday, March 4, 4 pm</td>
<td>Assignment 3 due</td>
</tr>
<tr>
<td>Wednesday, March 9</td>
<td>In-class Midterm</td>
</tr>
<tr>
<td>Friday, March 18, 4 pm</td>
<td>Assignment 4 due</td>
</tr>
<tr>
<td>Friday, March 25</td>
<td>Holiday: no classes</td>
</tr>
<tr>
<td>Thursday, March 31, 4 pm</td>
<td>Assignment 5 due</td>
</tr>
<tr>
<td>Wednesday, April 13, 4 pm</td>
<td>Assignment 6 due; Lectures end</td>
</tr>
<tr>
<td>Saturday, April 16 – Wednesday, April 27</td>
<td>Final exam scheduled by Registrar</td>
</tr>
</tbody>
</table>

**Note:** Assignments handed in after their due dates are given a grade of zero. Extensions are only granted for medical or other serious reasons, and must be supported with documentation. Extensions must be requested before the due date in person from the professor (not the TA).