Columbia College
Vancouver, Canada

<table>
<tr><th colspan="5">Course Outline</th></tr>
<tr><td>Term: Fall 2025</td><td colspan="2">Course No: CSCI 150</td><td colspan="2">Course Credits: 3</td></tr>
<tr><td>Instructor: Jetic Gū</td><td colspan="2">Course Section No: 15</td><td>Total Hours: 65</td><td>Total Weeks: 13</td></tr>
<tr><td>Instructor Office:
Room No. 544
Main Campus</td><td colspan="2" rowspan="2">Course Title:
Introduction to Digital and Computer Systems Design</td><td colspan="2" rowspan="2">Main Campus
Room 420</td></tr>
<tr><td>Instructor Email:
jgu@columbiacollege.ca</td></tr>
<tr><td colspan="5">Class Meeting Days/Time:
Tue/Fri: 14:00-15:50; One hour FLEX</td></tr>
<tr><td colspan="2">Instructor Office Hours:
TF 12:00-14:00</td><td colspan="3">Course Format:
In person</td></tr>
<tr><td colspan="2">Course Prerequisites
Computer Science 120</td><td colspan="3">Course Corequisites
English 098</td></tr>
<tr><td colspan="5">Transferability to: visit bctransferguide.ca</td></tr>
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Course Description:

This course introduces students to the basic concepts of digital logic design, and the function and use of typical digital components belonging primarily to the small and medium scale integration (SSI, MSI) families. The design principles will be used to develop an understanding of how the functional capabilities can be provided by hardware for the operation of a microprocessor. In addition, this course will introduce the student to machine language, its relationship to the design of a computer, and its symbolic representation as assembly language. The assembly language of a particular CPU will be used to illustrate machine language programming concepts. An interactive logic simulation environment for designing and testing logic circuit design will be used for the assignments.

Additional Course Details:

Required Texts/Readings/Learning Resources:

Textbook: *Logic and Computer Design Fundamentals,* 5th edition, M. Morris Mano, Charles R. Kime, Tom Martin, Pearson, 2016.

Recommended:
LogicWorks5, Capilano Computing Systems Ltd, Addison-Wesley, Manual & software used for digital hardware simulation.

Course Learning Outcomes: Upon successful completion of this course the student will be able to:

1. Students learn how to analyse digital logic circuits.
2. Students learn how to design digital logic circuits.
3. Students learn to implement and test digital circuits using SSI, MSI logic elements.
4. Students should be to able understand the design principles and techniques used for Arithmetic and logic unit of computer.

Course Content/Schedule*

Week	Topic(s)	Readings	Assessments	Briefly describe list (via number) the outcomes linked to the assessments.
1	Numbers Systems. Binary, Octal, Dec, Hex numbers and Conversions	Ch 1: Digital systems and information		1, 2
2	1's and 2's complement. Subtraction using 2's complement. Signed Number representation BCD Code, 2421 Code, Excess-3 code, Gray Code.	Ch 1: Digital systems and information	Assignment 1 due;	1, 2
3	Review; Boolean algebra. Expression of Digital Function in Boolean Algebra. Canonical Forms; Sum of Minterms, Product of Maxterms. Standard Forms: SOP, POS. Conversion between forms. Positive and Negative Logic.	Ch 2: Logic circuits	Quiz 1;	1, 2, 3
4	Introduction to LogicWork, K-map 2 variables, 3 variables, 4 variables, Don't care conditions, Two level NAND implementation, Two level NOR implementation, Exclusive OR, Parity Generator/ checker	Ch 2: Logic circuits	Assignment 2 due;	1, 2, 3
5	Design analysis, BCD to Excess-3, combinational circuit building blocks (Decoder, Encoder, Multiplexer)	Ch 3: Combinational logic circuits	Quiz 2;	1, 2, 3
6	Synthesis of logic functions using decoders, multiplexers-demultiplexers, function implementations using multiplexers	Ch 3: Combinational logic circuits	Assignment 3 due;	1, 2, 3

7	Half Adder, Full Adder, 4 bit Binary Adder, Adder-Subtractor	Ch 3: Combinational logic circuits	Quiz 3;	1, 2, 3
8	Review - Midterm	All covered content	Midterm;	
9	Sequential Circuits. Introduction, Latches: SR, S'R', D Latch. Edge Triggering. JK Flip Flop, T Flip Flop, characteristic table, characteristic equations	Ch 4: Sequential circuits	Assignment 4 due;	1, 2, 3
10	Analysis of clocked sequential circuits. State equation, State table, State diagram using D-Flip-Flop Analysis with JK Flip Flop. Analysis with T Flip Flop	Ch 4: Sequential circuits	Assignment 4 due;	1, 2, 3
11	Design with D Flip Flop, Design with JK Flip Flop, Design with T Flip Flop	Ch 4: Sequential circuits	Quiz 4;	1, 2, 3
12	Registers, 4-bit registers, Shift registers, Ripple Counters: Binary ripple counter. BCD Ripple counter. Synchronous counters: Binary counter, Up Down binary counter. BCD counter.	Ch 6: Registers and register transfers	Assignment 5 due;	1, 2, 3
13	Review	Review		
14	FINAL EXAM			

*Timing subject to change

Evaluation Criteria

Evaluation Methods	**%**	**Comments**
Labs & Assignments	30	
Quiz	10	
Midterm	20	
Final	40	
Total	**100%**	

Classroom Code of Conduct:

Students will be prepared for any appointments with the instructor or other students – this means logging in and getting out paper, pens, necessary texts and so on before the appointment starts.

1. Students will communicate respectfully when interacting with the instructor or classmates.

2. Students will respectfully communicate with the instructor and classmates in discussion groups, office hours, and in any type of electronic communication.
3. Students will respond to messages/emails from the instructor or other classmates in a timely manner.

Cheating and Plagiarism Policy:

Columbia College expects all students to uphold the principle of academic honesty. Cheating and plagiarism (presenting another person's words or ideas as one's own) are not acceptable behaviour at any educational institution. Depending on the severity of the offence such acts can result in a grade of zero on the test or assignment, a failing grade (F) in the course, or expulsion from the college. In all cases, the circumstances and the penalty are recorded in the student's file.

Academic misconduct not covered in the College's Cheating and Plagiarism Policy, is covered under Academic Policy 2.6 Academic Misconduct. It can be found at the following link: https://www.columbiacollege.ca/about/college-policies/ . You are expected to familiarise yourself with this policy, as it covers serious issues including uploading copyright material, submission of falsified records and other strategies to gain unfair academic advantage. If you are unclear on the contents, please ask for clarification.

Course-Specific Policies:

1. Minimum Final Exam and Lab Grades Policy

Students must achieve 50% in Labs, 50% in the Final exam, and 50% in overall grade to pass the course.

2. Late Submission / Resubmission Policy

If a student is affected by personal issues such as sickness, injuries, the passing of a relative, or other traumatising experiences, the student should contact an advisor and seek professional help and the instructor will try to accommodate as much as possible. Otherwise, late submissions and resubmission are not allowed beyond the original due.

Grading System

Grade Percentage	Grade Points	Rating
A+ 90-100	4.3	Excellent
A 85-89	4.0	
A - 80-84	3.7	Very Good
B+ 76-79	3.3	
B 72-75	3.0	
B - 68-71	2.7	Good
C+ 64-67	2.3	
C 60-63	2.0	Satisfactory
C- 55-59	1.7	

D	50-54	1.0	Marginal Pass
F	0-49	0.0	Fail
N	Below 50	0.0	Failure for non-completion or non-attendance

Please see the college calendar for more information about grading and related policies.