Indiana University of Pennsylvania (IUP)

Computer Science Department

Course Syllabus

Course: COSC300 Computer Organization & Assembly Language
Semester: Spring 2013
Day/Time: M, W / 11:15AM – 12:05PM / STR 331
F / 11:15AM – 12:05PM / SRT 320
Professor: Dr. Sanwar Ali
Office: STR 330

Office Hrs: M, W, F / 10:00AM – 11:00AM
M, F / 12:30PM – 1:30PM
Phone: (724) 357-7994
E-mail: sanwar@iup.edu


Prerequisite: COSC 110

Syllabus of Record: http://www.iup.edu/page.aspx?id=57191

Course Description:
Discussion of the basic computer architecture elements: gates, combinational and sequential logic, hardware arithmetic, CPU and memory structure. Examination of the languages of machines: representation of data, addressing techniques, symbolic coding, assembly, and linking. Problem solving using assembly language.

Course Outcomes:
Upon successful completion of this course, the student will be able to
- describe the operation of various logic gates and the theory (Boolean algebra) behind them
- distinguish between combinational and sequential logic and discuss the function of the clock
- describe how a CPU performs instructions during the fetch-decode-execute cycle and how the memory supports its actions
- design simple digital logic to produce a specific result from given inputs and/or simplify digital logic to improve the efficiency of producing a result
- describe how information of various data types are represented in a computer
- explain how standard arithmetic operations are performed by the hardware
- read, write, and debug programs in assembly language
- explain the uses of various machine addressing modes and why they are used
- use system services in a program
- explain the internal workings of the machine on a procedure call and describe the structure of the call frame
- distinguish between situations in which procedures or macros are appropriate
Tentative Course Schedule:

<table>
<thead>
<tr>
<th>Week</th>
<th>Chapter</th>
<th>Topics</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>3 (text 1)</td>
<td>3.1 Digital Logic Level – Gates and Boolean Algebra, Application of Boolean Algebra to Digital Logic - Truth tables, Identities, Simplification of Logic</td>
</tr>
<tr>
<td>2</td>
<td>3 (text 1), notes</td>
<td>3.2 Basic Digital Logic Circuits- Combinational Logic – Karnaugh Maps, Quine-McKluskey Algorithm, Multiplexer, Demultiplexer, Decoder, Comparator</td>
</tr>
<tr>
<td>3</td>
<td>3 (text 1)</td>
<td>Shifters, Half Adder, Full Adder., carry ripple adder, carry select adder, fast adders, ALU</td>
</tr>
<tr>
<td>4</td>
<td>3 (text 1), notes</td>
<td>3.3 Memory- Sequential Logic, Latch, Clocked Latch, Clocked D Latch, Flip-Flops, Registers, Memory Organization</td>
</tr>
<tr>
<td>5</td>
<td>2 (text 1)</td>
<td>2.1 Processor- CPU Organization, Instruction Execution, Pipelining, Multiprocessor, 2.2 Primary Memory- Memory Address, Byte Ordering, Error Correcting Codes EXAM-I</td>
</tr>
<tr>
<td>6</td>
<td>1 &amp; 2 (text 2)</td>
<td>1. Virtual Machine Concepts- data representation - 2’s complement integers, Binary Integers (signed, unsigned), Hexadecimal Form 2. Process Architecture- 2.1 General Concepts, 2.2 x86 Architecture Details, 2.3 Memory Management, 2.4 x86 Computer Components, 2.5 Input/Output Systems</td>
</tr>
<tr>
<td>7</td>
<td>3 (text 2)</td>
<td>3. Assembly Language Fundamentals– 3.1 Basic Elements of Assembly Language, 3.2 Adding and Subtracting Integers, 3.3 Assembling, Linking and Running Programs, 3.4 Defining Data, 3.5 Symbolic Constant</td>
</tr>
<tr>
<td>8</td>
<td>4 (text 2)</td>
<td>4.1 Data Transfer Instruction, 4.2 Addition and Subtraction, 4.3 Operators and Directives, 4.4 Indirect Addressing, 4.5 JMP and Loop Instructions</td>
</tr>
<tr>
<td>9 &amp; 10</td>
<td>5 (text 2)</td>
<td>5. Procedures – 5.2 Linking to an External Library, 5.3 Link Library, 5.4 Stack Operations, 5.5 Defining and Using Procedures, 5.6 Program Design Using Procedures EXAM-II</td>
</tr>
<tr>
<td>11</td>
<td>6 (text 2)</td>
<td>6. Conditional Processing – 6.2 Boolean and Comparison Instructions, 6.3 Conditional Jumps, 6.4 Conditional Loop Instructions, 6.5 Conditional Structures, 6.6 Finite-State Machines</td>
</tr>
<tr>
<td>12&amp;13</td>
<td>7 (text 2)</td>
<td>7. Integer Arithmetic, 7.2 Shift and Rotate Instructions, 7.3 Shift and Rotate Applications, 7.4 Multiplication and Divisions Instructions, 7.5 Extended Addition and Subtraction</td>
</tr>
<tr>
<td>14</td>
<td>10 (text 2)</td>
<td>10. Structure and Macros, 10.1 Structures, 10.2 Macros, 10.3 Conditional Assembly Directives, 10.4 Defining Repeat Blocks Review for Final Exam</td>
</tr>
</tbody>
</table>

FINAL EXAM (Cumulative) - Wednesday, May 15, 2013 / 10:15AM – 12:15PM / STR 331

Grading Policy:
- There will be two classroom exams and a cumulative (cumulative though weighted in favor of later topics) final exam.
- There will be at least two quizzes.
- About six/seven lab projects will be assigned.
- No late assignments will be accepted unless student has valid excused absence (doctor’s certificate) and/or prior permission from the instructor.
- **No makeup** class test will be given unless student has valid excused absence (doctor’s certificate) and/or prior permission from the instructor.
- There is **no makeup for the final exam.**
- If any student misses classes for **5 days without valid excuse**, the student will be given “F” grade in the course.
- Attendance will be taken each day of the class.

**Grade distribution:**

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Two Classroom Exams</td>
<td>35%</td>
</tr>
<tr>
<td>Final Exam (Cumulative)</td>
<td>25%</td>
</tr>
<tr>
<td>Lab Projects+Assignments+Quizzes+Bonus</td>
<td>40%</td>
</tr>
</tbody>
</table>

**Grade Scale:**

<table>
<thead>
<tr>
<th>Grade</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>90-100%</td>
</tr>
<tr>
<td>B</td>
<td>80-89%</td>
</tr>
<tr>
<td>C</td>
<td>70-79%</td>
</tr>
<tr>
<td>D</td>
<td>60-69%</td>
</tr>
<tr>
<td>F</td>
<td>Less than 60%</td>
</tr>
</tbody>
</table>

**Late Policy:**

Any assignment that is turned in after the due date will be reduced by 20%. **No assignments will be accepted later than one week after the due date.** The instructor, prior to the due date, must approve valid excuses for late assignments with no penalty. Valid excuses for makeup test must be obtained from the instructor ahead of time.

**Cheating Policy:**

Cheating and plagiarized documents will not be accepted for grading. Such acts will be dealt with according to the University policy as described in the IUP Undergraduate Catalog. Students are expected to uphold the school’s standard of conduct relating to academic honesty. Students assume full responsibility for the content and integrity of the academic work they submit. The guiding principle of academic integrity shall be that a student's submitted projects, exams, and reports must be that of the student's own work.

**Academic Integrity Policy:**

Indiana University of Pennsylvania expects a full commitment to academic integrity from each student. This syllabus represents a contract between you and the instructor of this course and that you agree to follow the rules and expectations set up herein. Violations of academic integrity include the following:

- Providing or receiving unauthorized assistance in coursework, including papers, quizzes, and examinations.
- Using unauthorized materials and resources during quizzes and tests.
- Possessing course examination materials without the prior knowledge of the instructor.
- Plagiarizing, using papers, dissertations, essays, reports, speeches, and oral presentations, take-home examinations, computer projects, and other academic exercises or passing off of ideas or facts beyond common knowledge, without attribution to their originators.
- Engaging in behaviors that are disruptive or threatening to others.
- Using computer technology in any way other than for the purposes intended for the course.

Please note that IUP faculty members use a variety of technologies to check the authenticity of student work. Violations of academic integrity will be handled per IUP’s Academic Integrity Policy and Procedures. Failure to comply with the policies and procedures may result in a decrease in grade, involuntary withdrawal from an academic program, suspension, expulsion, or rescission of a conferred degree. IUP’s full policy on academic integrity is available in the Undergraduate Catalog under Academic Policies at [http://www.iup.edu/registrar/catalog/](http://www.iup.edu/registrar/catalog/).

**Disability Support Services:**

Students with disabilities are entitled to reasonable accommodations, as determined by the institution, after proper documentation of the disability has been received. If you believe that reasonable accommodations are needed, please
contact the IUP Advising and Testing Center Disability Support Services at (724) 357-4067 or at http://www.iup.edu/disabilitysupport.

APSCUF Institute for Excellence (I-EXCEL) Statement: “APSCUF is the Association of Pennsylvania State College and University Faculties. We uphold the highest standards of teaching, scholarly inquiry, and service. We are an organization that is committed to promoting excellence in all that we do to ensure that our students receive the highest quality education.”

How to Access my Lecture Notes through the Internet:

1. Click on Internet Explorer.
2. Type URL: http://www.acad.iup.edu on the address (or status) line.
3. You will see “P-Drive”, “I-Drive”, and “N-Drive”.
4. Click on Instruct Drive (“I-Drive”).
5. A small window will appear asking your “user name” and “password”.
6. At user name line, type iupmsd\your 4 character user name.
7. At password line, type your own password to access IUP computer network system.
8. Click on Log On.
9. All faculty members’ directories will appear on the screen.
10. At the address line you will see this URL: ftp://www.acad.iup.edu/instruct
11. Add sanwar at the end of the URL, just like ftp://www.acad.iup.edu/instruct/sanwar and hit enter.
12. My all course directories will appear on the screen.
13. Click on icon COSC300
14. Then click on the icon COSC300-SP2013.
15. You will see all teaching materials related this course.
16. You can read these PowerPoint lecture notes.
17. By this method anyone can access my lecture notes from any corner of the world.
How to compile and execute a source program in assembly language (within the DOS prompt)?

1) Click Start → Programs → Accessories → Command Prompt

2) Type in the following

```
set path=c:\masm615
```

3) Use the cd command to call your directory where you have your .asm file located. For example, if your program is in the F: (or D:) drive, you type the following

```
F: (or D:)
```

If you have your source file in a folder, then type:

```
cd folderName
```

This would take you to the folder in your F: (or D:) drive where you have your .asm file saved.

4) Compile the program as follows:
   if your program source is called myProgram.asm (for example), then you type the following:

```
make32 myProgram   (DO NOT include .asm extension)
```

5) One of two things will happen after you compile
   a. If your program is not correct, it will not compile, instead it prints a list of syntax errors in your program.
   b. If your program is correct, it will complete all steps necessary to produce the executable file (e.g. compile, link, map, etc ...)
   c. If your program is compiled successfully, five files will be created that has the same name as your source file but with different extensions. Below is a sample of a successfully compiled program and the listing of the files that were created:

Assembling: ADDSUB.asm
Volume in drive C has no label.
Volume Serial Number is BC23-34BD

Directory of C:\Masm615

```
2/20/2006 03:36 PM  307 ADDSUB.ASM
2/22/2006 05:48 PM  28,710 addsub.exe
2/22/2006 05:48 PM  33,300 addsub.ilk
2/22/2006 05:48 PM  15,237 ADDSUB.lst
2/22/2006 05:48 PM  6,938 addsub.map
2/22/2006 05:48 PM  3,684 addsub.obj
2/22/2006 05:48 PM  91,136 addsub.pdb
```

7 File(s)  179,312 bytes
0 Dir(s)  66,850,988,032 bytes free
Press any key to continue . . .

6) The final step is to execute your program. To do that, simply type the name of the program (.exe is optional).