Course Syllabus

Fall 2021

Course Description: The course will cover the following topics: Introduction to computer organization, data and information representation and processing, machine-level representation of programs, instruction set architecture, pipelining, optimizing program performance, memory hierarchy, cache memories, virtual memory. Prerequisites: CENG 232.

Instructors:
Erol Şahin (Sections 2)
Office: A207, Tel: 210 5539,
Office hours: By appointment.

Teaching assistants: Çağrı Utku Akpak, Cem Önerem, Deniz Sayın, Merve Taphi

Section 2 schedule: Full Google Calendar link (you can add it to your own calendar):
https://calendar.google.com/calendar/u/0?cid=MXBzZTRtamo5ZmJiZnV0aGZycDdnbDZrc3NAZ3JvdXAxUT0K
Online lectures:
– Monday 16:40-17:30
– Thursday 09:40-11:30

Zoom link:
https://zoom.us/j/8901561204?pwd=ek1uek1SRlddHMVBsZW9mT29XaVFlUT09
Meeting ID: 890 156 1204
Passcode: 570045

– Book student web site: http://csapp.cs.cmu.edu/3e/students.html
– Video recordings from lectures at Carnegie- Mellon Univ. https://youtube.com/playlist?list=PLcQU3vbfgCc9sVAihf5761UUApjZ3ZD3x

Grading policy:

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Midterm Examination</td>
<td>30%</td>
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<tr>
<td>4 Take-Home Lab (Homework) Assignments</td>
<td>24%</td>
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<tr>
<td>Final Examination</td>
<td>36%</td>
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<tr>
<td>Participation and/or quizzes</td>
<td>10%</td>
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</tbody>
</table>

You will not be allowed to take the final exam if you fail to accumulate 10/24 points in total from the assignments and will automatically get NA grade.

The midterm and final exams will be held in person (face-to-face). Online make-up’s and/or oral exams will be considered as options if needed.
Algorithm 1 Lab Grading

1: \( l : \{\text{Bomb, Attack, Architecture, Performance}\}\)
2: \textbf{procedure} Lab\((l)\)
3: \( H \leftarrow \) Your grade from lab homework, out of 100 + bonus
4: \textbf{if } \( l \equiv \text{Bomb} \lor l \equiv \text{Attack} \textbf{then} \) \( \triangleright \) Bomb and Attack labs have quizzes
5: \qquad \textbf{if } \( H \leq 50 \textbf{then} \)
6: \qquad \qquad \( Q \leftarrow 0 \) \( \triangleright \) Not allowed to take the quiz
7: \qquad \textbf{else} \qquad \( L \leftarrow 0.6 \times H + 0.4 \times Q \) \( \triangleright \) Your final grade from the lab
8: \textbf{else} \qquad \( Q \leftarrow \) Your grade from lab quiz, out of 100
9: \qquad \( L \leftarrow 0.6 \times H + 0.4 \times Q \) \( \triangleright \) Your final grade from the lab
10: \textbf{else} \qquad \( \triangleright \) Architecture and Performance labs have no quizzes
11: \( L \leftarrow H \) \( \triangleright \) Your final grade from the lab

Algorithm 2 Course Grading

1: \textbf{procedure} CourseGrading
2: \( MT \leftarrow \) Your grade from Midterm, out of 100
3: \( Att \leftarrow \) Your grade from attendance and online quizzes, out of 100
4: \( \text{Labtotal} \leftarrow \text{Lab(Bomb)} + \text{Lab(Attack)} + \text{Lab(Architecture)} + \text{Lab(Performance)}\)
5: \textbf{if } 0.06 \times \text{Labtotal} \leq 10 \textbf{then} \( \triangleright \) Not allowed to take the final
6: \quad \( \text{LetterGrade} \leftarrow \text{NA} \) \( \triangleright \) Failure with no Resit exam option
7: \textbf{else} \quad \( \triangleright \) Architecture and Performance labs have no quizzes
8: \quad \( Final \leftarrow \) Your grade from Final, out of 100
9: \quad \( \text{Total} \leftarrow 0.3 \times MT + 0.36 \times Final + 0.1 \times Att + 0.06 \times \text{Labtotal} \)
10: \quad \( \text{LetterGrade} \leftarrow \) Letter based on \( \text{Total} \) \( \triangleright \) Letter grades FF to AA
• Communication:
  – All communication (announcements, resource sharing, emails and discussions) will be handled through ODTUClass:
  – Use email only for individual matters and include CENG331 in your subject line!

• Academic Integrity: Discussions about assignments are encouraged. However, your submissions must result from your own work. Violation of these general principles will be handled based on the university regulations and will result in disciplinary action.
## Course Schedule

<table>
<thead>
<tr>
<th>Week</th>
<th>Lecture</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Overview + Bits and Bytes</td>
</tr>
<tr>
<td>2</td>
<td>Integers</td>
</tr>
<tr>
<td>3</td>
<td>Floats</td>
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<tr>
<td>4</td>
<td>Assembly - Instructions</td>
</tr>
<tr>
<td>5</td>
<td>Assembly - Control Structures</td>
</tr>
<tr>
<td>6</td>
<td>Assembly - Procedures + Data structures</td>
</tr>
<tr>
<td>7</td>
<td>Y86 and HCL + Sequential Y86</td>
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<tr>
<td>8</td>
<td>Pipelined Y86</td>
</tr>
<tr>
<td>9</td>
<td>Optimization</td>
</tr>
<tr>
<td>10</td>
<td>Exceptional Control</td>
</tr>
<tr>
<td>11</td>
<td>Memory Hierarchy -1</td>
</tr>
<tr>
<td>12</td>
<td>Memory Hierarchy - 2</td>
</tr>
<tr>
<td>13</td>
<td>Virtual Memory - 1</td>
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<tr>
<td>14</td>
<td>Virtual Memory - 2</td>
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