SYSE 595 Hardware-Software Integration

1. Basic Information:

   1. Course Number: SYSE 595
   2. Course Title: Hardware-Software Integration (HSI)
   3. Credit Hours: 4
   4. Pre-Requisites: Basic understanding of hardware and software systems, e.g., ECE 103 Engineering Programming and CS 162 Intro. To Computer Science I or II. No code experience is required.
   5. Instructor: John E. Blyler, BS Engineering Physics, MS EE
   6. Class Location: Online
   7. Class Hours: Online – New “Week” begins on Mondays
   8. Office Hours: Email, phone, online
   9. Phone: 503-614-1082
   10. Email address: blylerj@pdx.edu or j.blyler@ieee.org
   11. Final Exam: Online Exam – Self Schedule During Exam Week
      - Recommend buying the textbook used online, e.g., Amazon.

2. Course Description

   Few engineers can remain purely hardware or software designers. Today’s systems – from chip and boards to PCs and networks – require at least a working knowledge of both worlds. This course presents trends and techniques to equip engineers with a larger “systems” view of electronics. Students will gain understanding of the many hardware-software, analog-digital, chip-package-board trade-offs that go into today’s commercial and industrial electronics: how software looks to a hardware design and vice versa; system-level trade-off modeling and techniques; understand how the move to multi-core and multi-processor systems is affecting hardware, software and system designers; and understand how Intellectual Property (IP) is changing the way hardware, software and the interfaces are designed.

3. Specific Goals and Objectives:

   Key objectives are:

   1. To apply basic system engineering concepts to the development of hardware-software systems.
2. Learn to overcome the common “hammer-nail” syndrome in hardware-software design
3. Understand how software looks to a hardware designer and vice versa
4. Gain a basic understanding of terminology and development flow of chip and board-level systems
5. Learn to use system-level trade-off analysis and modeling techniques
6. Understand how Intellectual Property (IP) is changing the way professionals design hardware, software and the interfaces

4. Logistics:
Success in this course will require:

1. Reading and completing weekly assessments by the assigned date
2. Posting assignment results on, or before, the assigned date
3. Successful completion of Mid-Term and Final Examinations
4. Active participation in online discussions in the forums

5. Metrics for Student Progress

1. Total of 400 points
   1. Written Assignments [9] (180 points total)
   2. Mid-Term Exam (110 points)
   3. Final Exam (110 points)
2. Grades will be assigned as follows (this is the minimum guaranteed distribution, the instructor reserves the right to adjust the lower thresholds as needed to ensure adequate representation of effort)
   1. 400-372 : A
   2. 371-360 : A-
   3. 359-348 : B+
   4. 347-332 : B
   5. 331-320 : B-
   6. 319-308 : C+
   7. 307-292 : C
   8. 291-280 : C-
   9. 279-268 : D+
   10. 267-240 : D
   11. 239-000 : F
3. Refer to Blackboard for due dates. *There is a 5 point penalty per day late*.

6. Tentative Week Plan [Deliverables are Due by 8AM PST on Monday of Following Week]

1. Week 1 Reading / Written Assignment #1
2. Week 2: Reading / Written Assignment #2
3. Week 3: Reading / Written Assignment #3
4. Week 4: Reading / Written Assignment #4
5. Week 5: Reading / Mid Term / Written Assignment #5
6. Week 6: Reading / Written Assignment #6
7. Week 7: Reading / Written Assignment #7
8. Week 8: Reading / Written Assignment #8
9. Week 9: Reading / Written Assignment #9
10. Week 10: Review/ Project and Final

7. Tentative Week Topics and General Reading [Specifics will be given each week]

- **Week 1 Overview of Key Systems Engineering Concepts**
  - Course Notes; K&S – Ch. 10

- **Week 2 Managing the Interface**
  - Course Notes

- **Week 3 Hardware Life-Cycle Development**
  - Course Notes: Vahid/Givargis; Blyler/Ray

- **Week 4 Software Life-Cycle Development**
  - Course Notes; Blyler’s OMSE lectures; Vahid/Givargis

- **Week 5 Co-Design and Modeling**
  - Integration role in co-design and co-verification phase; Vahid/Givargis; K&S

- **Week 6 Integration**
  - Moving up the V-Diagram - Course Notes

- **Week 7 Integration Decision Making**
  - Known-Unknown hw-sw issues; Make vs. buy, others - Course Notes; Blyler/Ray, Blanchard

- **Week 8 Integration in Production and End-of-Life Cycle**
  - Course Notes

- **Week 9 Trends in Hardware-Software Systems**
  - Course Notes

- **Week 10 Review**
  - Project and Final Week