1. **Course Number and Course Title**
   COE425 – Modern Computer Organization

2. **Credit Hours**
   3-0-3

3. **Prerequisites and/or Co-Requisites:**
   Prerequisite/Concurrent: Prerequisite: COE341 (Computer Architecture and Organization)

4. **Name and Contact Information of Instructor:**
   Dr. Assim Sagahyroon
   Office: EB1-255
   Email: asagahyroon@aus.edu
   Phone: (06)515-2952
   Office Hours: Sunday 11:00 – 12:00 & Tuesday 12:00 -1:00 PM

5. **Course Description (Catalog Description):**
   Covers Performance measures, RISC processors, datapath and control units design, memory hierarchy, pipelining, I/O systems and multiprocessors

6. **Textbook and other Supplemental Material:**

   Textbook:

   J. Hennesy and D. Patterson, *Computer Organization & Design: the hardware/software interface*. 5th Edition, Morgan Kaufmann,

   Other supplemental material:
   None

7. **Learning Outcomes:**
   Upon completion of the course, students will be able to:
   1. Analyze computers systems from high levels of abstraction all the way to a gate level realization
   2. Design instruction sets for modern processors
   3. Demonstrate a high level understanding of computer arithmetic and be able to design digital arithmetic circuits
   4. Apply the IEEE 754 floating point standard to perform high level arithmetic operations
   5. Design single cycle and multi-cycle data paths
   6. Design control units using hard-wired and memory based approaches
   7. Describe the principles of caching and assess the performance of cache memories under various replacement policies
   8. Describe and analyze virtual memory systems
   9. Design pipelined processors, describe the role of pipelining and its impact on the speed of a processor
   10. Demonstrate a basic understanding of multicores and multiprocessors

8. Teaching and Learning Methodologies:

Methods include lectures; problem and project based learning methods (homework, simulation-based projects) and class discussions.

9. Course Topics and Schedule:

Topic	Weeks
Computer Performance Measurement	1
Instructions Design (MIPS Processor)	2
Computer Arithmetic	2
Processor Datapath and Control Design (including pipelining, data hazards, etc)	3
Memory hierarchy (including cache performance, virtual memory, TLBs, etc)	3
Storage and input/output	1
Multiprocessors	2
Review & Evaluation	2
Total:	16

10. Schedule of Laboratory and other Non-Lecture Sessions:

Not Applicable

11. Out-of-Class Assignments with Due Dates:

Assignment	Due Date (tentative)
Homework 1	Week 1
Homework 2	Week 2
Homework 3	Week 4
Homework 4	Week 6
Homework 5	Week 8
Homework 6	Week 10
Project #1	Week 11
Project #2	Week 13

12. Student Evaluation:

Assessment	Weight
Homework	5 %
Quiz	5%
Midterm Exam # 1	20 %
Midterm Exam # 2	20%
Projects	20%
Final Exam	30 %

13. Contribution of Course to Program Outcomes

Program outcome	**Emphasis in this course**
(a) an ability to apply knowledge of mathematics, science, and engineering	◑
(b) an ability to design and conduct experiments, as well as to analyze and interpret data	
(c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability	
(d) an ability to function on multidisciplinary teams	
(e) an ability to identify, formulate, and solve engineering problems	◑
(f) an understanding of professional and ethical responsibility	
(g) an ability to communicate effectively	
(h) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context	
(i) a recognition of the need for, and an ability to engage in life-long learning	
(j) a knowledge of contemporary issues	
(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.	●

Emphasis: ● High; ◑ Medium; ○ Low; Blank – Nothing Specific Expected