1. Course Number and Course Title:

COE 594-03 Cyber Physical Systems

2. Credit Hours:

3-0-3

3. Prerequisites and/or Co-Requisites:

Prerequisite: Approval of Program Director Co-requisites: None Competencies: Undergraduate course in Embedded systems

4. Name and Contact Information of Instructor:

Dr. A.R. Al-Ali

5. Course Description (Catalog Description):

Covers Cyber Physical Systems (CPS) including the physical, communication, computing and application layers. Evaluates CPS physical layer computing platforms. Emphasizes sensors and actuators interfacing and programming. Covers CPS digital twins, data collections and communication protocols, and Interconnecting CPS layers using Internet of Things (IoTs) paradigm. Investigates CPS applications in smart buildings, energy, healthcare, transportations and factories. Overviews CPS security issues and techniques.

6. Textbook and other Supplemental Material:

Textbook:

• Danda B. Rawat, Joel J.P.C. Rodrigues, and Ivan Stojmenovic, Cyber-Physical Systems: From Theory to Practice, CRC Press, 2015.

Supplemental material:

• Journal and Conference Papers.

7. Course Learning Outcomes:

Upon completion of the course, students will be able to:

- 1. Describe CPS hardware and software layers.
- 2. Identify CPS role in smart environment.
- 3. Utilize existing single computing platforms to interface sensors and actuators.
- 4. Design CPS input and output signal conditioning circuits.
- 5. Employ existing cloud computing platforms.
- 6. Investigate CPS cyber security threats.
- 7. Design and develop CPS for smart applications.

8. Teaching and Learning Methodologies:

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

9. Course Topics and Schedule:

Торіс	Weeks
CPS Layers	1
Design CPS sensors and actuators interfacing circuits	2
CPS computing platforms programming	2
CPS wired and wireless communicates protocols	2
CPS integration with cloud service for data storage, analysis and	2
visualization	
CPS security	2
Design, develop, implement and test CPS for selected smart cities and smart	3
factories applications and services	
Evaluation and Assessment	2
Total:	16