

**KISII UNIVERSITY**  
**Faculty of Information Science and Technology**  
SOFTWARE ENGINEERING  
**SOEN 315: EMBEDDED SYSTEMS**  
**STREAM: Y3S2 – JAN-APR 2017**

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**INSTRUCTOR**

Gordon Ouma  
P.O. Box 408-40200 Kisii  
254-722 897 207  
gouma@kisiiversity.ac.ke

CREDIT HOURS (C.F)      3.5

**COURSE DESCRIPTION:**

**Catalogue Description:** This is an analysis and design course focusing on using modern methods, techniques, and tools for specification and design of embedded systems. The course covers analytical methods such as Rate Monotonic Analysis, *development methods such as HOOD*, and *notations like Unified Mark-up Language, and Petri-nets*. The Course also covers performance evaluation based on modelling and simulation techniques. *In this course we consider the design of embedded hardware and software under pressures and constraints including performance, cost, size, time to market, power.*

**COURSE OBJECTIVES:**

At the completion of this course, the student will be able to:

- Describe Embedded Systems
- Explain the metrics for evaluating embedded systems
- Identify and overcome the challenges in embedded computing system design.
- Schedule tasks in embedded systems design.
- Apply appropriate Scheduling Algorithm for a given embedded system.
- Design and develop embedded system models.

**Grading**

CATs	20%
Assignments	10%
Final	70%

**Course Materials**

**Required Textbooks:**

Lee, E. A., & Seshia, S. A. (2017). *Introduction to Embedded Systems : A Cyber-Physical Systems Approach* (Second ed.): MIT Press. [Download](http://leeseshia.org/) (<http://leeseshia.org/>)  
Marwedel, P. (2006). *Embedded System Design*: Springer. [Download](#)

**Other References**

Bell, D. (2005). *Software Engineering for Students A Programming Approach* (Fourth ed.): Addison-Wesley.  
Hamacher, C., Vranesic, Z., Zaky, S., & Manjikian, N. (2012). *Computer Organisation and Embedded Systems* (Sixth ed.). New York: McGraw-Hill.  
Pressman, R. S. (2005). *Software Engineering A Practitioner's Approach* (Seventh ed.): McGraw-Hill.  
Schmuller, J. (2004). *Sams Teach Yourself UML in 24 Hours* (THIRD ed.): Sams Publishing.  
Sommerville, I. (2011). *Software Engineering* (Nineth ed.): Addison-Wesley.

Moodle E-learning portal, relevant websites and journals shall form part of the reference material.

COURSE CONTENT	
Week	Topics Covered
1	Introduction <ul style="list-style-type: none"> <li>- Overview of Embedded Systems</li> <li>- Application Areas of Embedded Systems</li> </ul>
2	Embedded Systems Design <ul style="list-style-type: none"> <li>- Design Process</li> <li>- Design Challenges</li> </ul>
3 and 4	Scheduling Algorithms <ul style="list-style-type: none"> <li>- Rate Monotonic Analysis</li> <li>- EDF, MUF, FIFO etc</li> </ul>
5	Overview of Hierarchical Object Oriented Design (HOOD)
6	CAT I
7	Review of Unified Modelling Language (UML) Components <ul style="list-style-type: none"> <li>- Use Case Diagrams</li> <li>- State Diagrams</li> <li>- Sequence Diagrams</li> <li>- Communication Diagrams</li> <li>- Activity Diagrams</li> <li>- Component Diagrams</li> <li>- Deployment Diagrams</li> </ul>
7	A Petri net (also known as a place/transition net or P/T net)
8	CAT II
9	Lab
10	Lab
11 & 12	Lab Project Presentations
13	Examination Preparation
14	Final Exams

### Class Policies

- 1) **Homework Policy:** Unless otherwise noted, homework is due in the Class following the assignment. Assignments should be printed and legible. Assignments on disk will not be accepted unless the nature of the assignment demands so.
- 2) **Group Project Policy:** Group projects should be submitted both in hard and soft copy. Soft copy should be sent by e-mail only.
- 3) **Exam Makeup Policy:** There will be no makeup exams except for extenuating circumstances.
- 4) **Return of CATs and Assignments:** All CATs and Assignments shall be returned to students before the Final Exams.