Course Title: Embedded Systems Design
Course code: 630414
Course Level: 4th Year
Course prerequisite(s): 630313
Class Time: 8:15-9:45 Monday & Wednesday
Credit hours: 3

Academic Staff Specifics

<table>
<thead>
<tr>
<th>Name</th>
<th>Rank</th>
<th>Office No.</th>
<th>Office Hours</th>
<th>E-mail Address</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eng Anis Nazer</td>
<td>Eng.</td>
<td>712</td>
<td>14:00-16:00 Sunday &amp; Tuesday</td>
<td><a href="mailto:anis.nazer@gmail.com">anis.nazer@gmail.com</a></td>
</tr>
</tbody>
</table>

Course description:
Basic introduction to microcontroller-based embedded systems design, development and implementation. It includes embedded system types, microcontroller architecture, programming, I/O interfacing, task scheduling, interrupt management and other related topics.

Course objectives:
The main objective of this course is to provide the student with the basic understanding of embedded systems design. This includes system requirements specifications, architectural and detailed design, and implementation, focusing on real-time applications. Learning the concepts will be enforced by a Project to design and develop an embedded system based on a single-chip microcontroller.

Course components
- Books (title, author(s), publisher, year of publication)
- Support material (s) (vcs, acs, etc).
- Study guide(s) (if applicable)
- Homework and laboratory guide(s) (if applicable).

Teaching methods:
Lectures, discussion groups, tutorials, problem solving, debates, etc.

Learning outcomes: upon completing this course, the student should have:
- Knowledge and understanding: Understanding principles of embedded systems design; be aware of architectures and behaviors of embedded systems.
Course Intended Learning Outcomes

A - Knowledge and Understanding

A1.  
A2.  
A3.  
A4.  
A5.  
A6.  
A7.  
A8.  

B - Intellectual Skills

B1.  
B2.  
B3.  
B4.  
B5.  
B6.  
B7.  
B8.  
B9.  

C - Practical Skills

C1.  
C2.  
C3.  
C4.  
C5.  
C6.  
C7.  
C8.  
C9.  
C10.  

D - Transferable Skills

D1.  
D2.  
D3.  
D4.  
D5.  
D6.  
D7.  

Assessment instruments

- **Short reports and presentations**: Reading related to current topic will be assigned every week. Assignments and other Homework (HW) will be given throughout the semester, focusing on the concepts learned from these readings.
- **Quizzes**: TWO to THREE Quizzes will be offered (dates TBD).
- **Project**: Project is an essential part of this course. Assessment will be based on 3 phases: System Specification, System Design, Hardware and Software Implementation with Project Demonstration. Detailed topics and schedule will be announced in due course.
- **Final examination**: 50 marks

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<thead>
<tr>
<th>Assessment Instruments</th>
<th>Mark</th>
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<tbody>
<tr>
<td>1st examination</td>
<td>20%</td>
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<tr>
<td>2nd examination</td>
<td>20%</td>
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<tr>
<td>Project &amp; Presentation</td>
<td>10%</td>
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<tr>
<td>Quizzes and Homework,</td>
<td>10%</td>
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<tr>
<td>Final Examination:</td>
<td>40%</td>
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<tr>
<td>Total</td>
<td>100%</td>
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Documentation and academic honesty

- Documentation style (with illustrative examples)
- Protection by copyright
- Avoiding plagiarism.
- **Ethics and Disability Act**:  
  - Students may consult with one another on solutions, but copying another student's code is strictly prohibited.
  - Students should write their own code. Using code found on books or internet is prohibited.
  - The Instructor follows general university “Academic Dishonesty/Cheating Policy”.
### Course academic calendar

<table>
<thead>
<tr>
<th>week</th>
<th>Basic and support material to be covered</th>
<th>Homework/reports and their due dates</th>
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<tbody>
<tr>
<td>(1)</td>
<td>Introduction to embedded systems.</td>
<td></td>
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<tr>
<td>(2)</td>
<td>Introduction to microcontroller Architecture.</td>
<td></td>
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<tr>
<td>(3)</td>
<td>Microcontroller Operation</td>
<td>HW1</td>
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<td>(4)</td>
<td>Microcontroller Programming: Instruction set.</td>
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<tr>
<td>(5)</td>
<td>Microcontroller Programming: Program Developing.</td>
<td>Project Selection</td>
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<td>(7)</td>
<td>Flow of Data.</td>
<td>HW2</td>
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<td>(8)</td>
<td>Memory Interfacing.</td>
<td></td>
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<tr>
<td>(9)</td>
<td>Analog I/O Interfacing</td>
<td></td>
</tr>
<tr>
<td>(10)</td>
<td>Serial Interfacing.</td>
<td>2nd exam 27/12/2015-5/1/2016</td>
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<tr>
<td>(11)</td>
<td>Dealing with Time.</td>
<td>Project (Phase1)</td>
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<tr>
<td>(12)</td>
<td>Interfacing to External Devices.</td>
<td></td>
</tr>
<tr>
<td>(13)</td>
<td>MiniProjects using Microcontrollers (1)</td>
<td>Project (Phase2)</td>
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<tr>
<td>(14)</td>
<td>MiniProjects using Microcontrollers (2)</td>
<td></td>
</tr>
<tr>
<td>(15)</td>
<td>Specimen Exam (Optional)</td>
<td>MiniProjects using FPGA</td>
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<tr>
<td>(16)</td>
<td>Final Exam</td>
<td>30/1-7/2/2016</td>
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### Expected workload:

On average students need to spend 2 hours of study and preparation for each 50-minute class/tutorial.

### Attendance policy:

Absence from classes and/or tutorials shall not exceed 15%. Students who exceed the 15% limit without a medical or emergency excuse acceptable to and approved by the Dean of the relevant college/faculty shall not be allowed to take the final examination and shall receive a mark of zero for the course. If the excuse is approved by the Dean, the student shall be considered to have withdrawn from the course.

The student is responsible for all assignments on a weekly basis.
No make-up will be given for missed quizzes, tests or assignments, unless a case is made in advance with Instructor’s approval.

### Course references

**Books**
12. J. Orwant, Designing Embedded Hardware, O'Reilly, 2002
15. Simon, Embedded Software Primer, Addison-Wesley, 1999
17. K. Topley, J2ME in a Nutshell, O'Reilly, 2002