Course Code | CE3003
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Course Title | Microcontroller Programming
Pre-requisites | CE/CZ2005
No of AUs | 3

**Course Aims**

This course aims to equip you with a general understanding of microcontroller architecture and microcontroller programming methods (with and without operating systems) using ARM Cortex-M3 microcontroller as an example. You will learn about the role of microcontrollers in embedded systems and their effective utilization to meet system performance requirements.

This course is ideal if you are interested in computing hardware and its programming. The course content will focus on ARM Cortex-M3 microcontroller and Micrium OS-III real time operating system, but you will also develop an understanding of transferable knowledge to work with other microcontroller architectures and real time operating systems in the industry.

This course will help you in finding industry jobs in embedded systems and electronic product design markets. If interested in research, this course will trigger your imagination with respect to microcontroller architecture development and real-time operating system requirements.

**Intended Learning Outcomes (ILO)**

This course introduces microcontroller programming at an intermediate level. Upon the successful completion of this course, you shall be able to:

1. Differentiate the various versions and features of the components in ARM microcontroller architecture
2. Program microcontrollers for simple embedded system tasks with a good understanding of underlying hardware architecture and system performance requirements
3. Develop efficient embedded software based on code optimization techniques.
4. Describe and discuss Real Time Operating System (RTOS) concepts and their importance in designing real time systems.
Course Content

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<th>Topics</th>
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<td>1   Microcontroller Architectures</td>
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<td>2   Cortex-M Architecture</td>
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<td>3   Compiler optimizations</td>
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<td>4   Efficient Real-time 'C' Programming Techniques</td>
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<td>5   Linking 'C' with Assembler and Libraries</td>
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<td>6   Programming Peripherals and Subsystems</td>
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<td>7   Handling Multiple Tasks in Real-Time</td>
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<td>8   Real-Time Operating Systems</td>
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Assessment

a) Final Examination: 60%
b) Laboratory Quiz: 30%
c) Team Based Learning (TBL) Activity: 10%

Reading and References

Reading
2. Student handouts prepared by the instructor

References:
3. Online reference materials shared by the instructor during the lectures