

ENGG4420 -- COURSE OUTLINE

- Chapter 1: Real-Time Computer Control
 - Sections: A) Real-Time Definitions and Development B) Dynamic Models; C) Feedback Control, PID, Tuning; D) Implementation of Real-Time Control Algorithms
 - **References:** 1) Feedback Control of Dynamic Systems By Franklin et al.; 2) Real-Time Computer Control By Bennett; 3) ENGG4420 Lab Manual by Radu Muresan.
- Chapter 2: Real-Time Operating Systems Concepts
 - Sections: A) Introduction; B) Common Kernel Objects; C) uC/OSII and VxWorks Concepts and Examples; D) PIP, PCP Protocols.
 - **References:** 2) MicroC/OS-II, The Real-Time Kernel By Labrosse; 3) Embedded Systems By Kamal.
- Chapter 3: LabVIEW Real-Time System Development
 - Sections: A) Data Acquisition; B) Real-Time LabView
 - **References:** 1) LabView 2009; LabView Real-Time Application Development Course by NI;
- Chapter 4: Scheduling
 - Sections: A) Uniprocessor and Multiprocessor Scheduling Algorithms; B) Real-Time Control Scheduling.
- Chapter 5: Real-Time System Modeling using Petri Nets
- Chapter 6: Safety and Reliability Issues in Real-Time Systems
- **References** for Chapters 4, 5, and 6: 1) Realtime Systems By Nissanke; 2) Real-Time Systems By Krishna et al.; 3) Real-Time Systems by Rajib Mall.

ENGG4420 -- LABORATORY

- **LAB 1:** Modeling the PT 326 Process Trainer using LabView and Altera uC/OS;
Simulation/Experimentation Lab.
- **LAB 2:** Real-Time Automotive Suspension System Simulator: ***Simulation Lab*** -- quarter car (undergraduate), half car (graduate)
- **LAB 3:** Wireless Real-Time Embedded Control of a Hot Air Plant using RTOS uC/OS-II:
Simulation/Experimentation Lab using LabView, uC/OS-II, Altera NIOS embedded boards, Crossbow motes.
- **LAB 4:** Multi-Core Real-Time Suspension Controller using LabView Real-Time OS:
Simulation/Experimentation Lab.
- **References:** 1) Engg4420: Real-Time Systems Design Lab Manual, 2010 By Radu Muresan; 2) Other resources made available on the course webpage.