BSE 3107 Real-Time and Embedded Systems (4 CU)

Course objectives: At the end of the couse students should be able to: (i) Demonstrate knowledge of rate monotonic theory and how to apply it to real-time applications; (ii) Understand the process and fundamentals of integrating microprocessor-based embedded system elements to realize systems that not only meet functional requirements, but timing and performance requirements as well; and (iii) Use practical skills to design and integrate a real-time operation system with a microprocessor to host real-time service data processing.

Course content: Rate Monotonic Theory, specifically the RM least upper bound, necessary and sufficient feasibility tests, and application of rate monotonic theory , Real-time Operating Sys- tems, scheduling, synchronization mechanisms, and resource management, Embedded system ar- chitectures: System-on-chip, scalable bus architectures, memory subsystems, Sensor and Actuator IO: ADC, DAC, servos, relays, stepper motors, H-bridge, and CODECs, Real-time embedded test equipment, software debug tools, and methods of performance profiling and tracing, Real-time ap- plications including voice/packet-switched links and networks, streaming video media, computer vision, digital control, and robotic system command and control

References

• M. Ben-Ari, Principles of Concurrent and Distributed Programming, Prentice Hall, 1990

• Stuart Bennett. Real-Time Computer Control: An Introduction, Printice Hall International, Series in Systems and Control Engineering, 1988

• Alan Burns and Andy Wellings, Real-Time Systems and Programming Languages, Addison

Wesley, third edition, 2001