COSC 407 (3) Introduction to Parallel Computing Design and implementation of parallel programs including theoretical computer models, parallel architectures (distributed, multicore, GPU), and standard parallel libraries. Credit will be granted for only one of COSC 407 or COSC 507. [3-2-0] Prerequisite: Either (a) COSC 111 or (b) APSC 177. Third-year standing is required. Specific description: The course will provide 3rd and 4th year students with an introduction to parallel computing. Upon completion of the course students will be able to understand parallel computing architectures and their limitations, create and implement parallel programs using various standard libraries, explain the limitation of the IEEE 754 floating point model, determine whether an undesirable output is due to floating point errors, and write parallel code. Topics include, Introduction to the course, Intro to C (basics, arrays, functions), Intro to C (pointers, struct, directives), Basic Concepts of Parallelism, OpenMP (A): Intro, OpenMP (B, C): Mutual Exclusion, Reduction, Sync, OpenMP (D): Work Sharing 1, OpenMP (E): Work Sharing 2, OpenMP (F): Example Applications, OpenMP (G, H): Speed/Efficiency, Misc, CUDA (A) : Introduction, CUDA(B,C): Programming model, Threads Organization, CUDA (D): Memories and Performance, CUDA (E,F): Thread Sync, Best Practices, CUDA: Practice Questions, Distributed Memory Concurrency (tentative – maybe discussed after Java Concurrency), Floating Point (tentative), Java Concurrency and Semaphores (tentative)