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| **ELEMENT** | **CONTENT** |
| DEPARTMENT | CIS |
| AUTHOR (S) | Peter C. Chapin |
| COURSE NUMBER | **CIS 4230** |
| COURSE TITLE | **Parallel Programming** |
| SHORT TITLE | Parallel Program |
| COURSE LEVEL | 4000 |
| DATE CREATED |  |
| CHECKED/CHANGED | 6/8/2017 |
| PREREQUISITES | CIS 2230, 3050 |
| COREQUISITES |  |
| RESTRICTIONS |  |
| SPECIAL FEES | No |
| CREDITS | 3 |
| HOURS | 3 hours of lecture per week |
| SEMESTER | As required |
| COURSE DESCRIPTION | This course examines the applications, algorithms, construction, configuration, and performance of parallel programs. Topics include shared memory parallelism using POSIX threads and OpenMP and multi-machine parallelism using MPI. Parallel programming on modern GPU devices is also introduced. |
| SUGGESTED TEXTS | *Principles of Parallel Programming*; Calvin Lin & Lawrence Snyder |
| OPTIONAL TEXTS |  |
| COURSE OUTCOMES | The successful student will be able to:   1. Understand the range of parallel programming options available 2. Understand the issues of approaches for safely controlling concurrency 3. Effectively write programs that take advantage of multiple threads in a shared memory system 4. Configure a local computing cluster 5. Effectively write programs that take advantage of message passing in a multi-machine cluster |
| COURSE CONTENT | 1. Introduction 2. Approaches and applications for parallelism 3. Amdahl’s law and Flynn’s taxonomy 4. POSIX thread creation and destruction 5. Shared memory synchronization primitives 6. Parallel decomposition via recursion 7. Performance tradeoffs with parallelism 8. Caching effects 9. Thread pools 10. OpenMP 11. Lock-free programming in shared memory systems 12. Memory models 13. Cluster software and its configuration 14. MPI 15. Communication networks and protocols 16. Parallel decomposition in clusters 17. Grid and cloud computing 18. Optional topics as time permits |
| LAB/STUDIO OUTCOMES |  |
| LAB/STUDIO CONTENT |  |
| LECTURE CAPACITY | 21 |
| LAB CAPACITY |  |
| GRADED OR P/NP | Graded |
| EVALUATION |  |
| DELIVERY METHOD | ONL |
| ROOM REQUIREMENTS | No room |
| AUTHOR’S NOTES |  |