

# CS5351.0501/0502, Summer I, 2009

## Parallel Processing

**Time:** 5:00 – 7:10pm MTWH  
**Classroom:** 366 Avery, RRHEC and 147 ALK, San Marcos

**Instructor:** Wuxu PENG  
**Office(s):** 464X Avery, RRHEC and 210 Nueces, San Marcos  
**Office Hours:** 3:00 – 4:15pm MTWH at RRHEC or San Marcos  
Or by appointment

**Phone:** 512-716-4562 (RRHEC) and 512-245-3874 (San Marcos)  
**Email:** wuxu@txstate.edu  
**Web:** <http://nueces21000.cs.txstate.edu/teaching/cs5351/sum-I-09/>  
**WebPage Username/Password:** cs5351/ToaddOpenMP

**Prerequisites:** CS3358 (Data structures) and CS4328 (Operating systems)

### **Textbooks:**

M. J. Quinn, *Parallel Computing: Theory and Practice*, 2nd ed.,  
McGraw-Hill, 1994 (ISBN: 0-07-051294-9).

Notes: Selected chapters of this book is on e-reserve, with password to be given in class.

### **General Information:**

This course will bring you to the fast-growing field of parallel algorithms design. The whole course is intended to provide you with a solid background in this area.

The course is centered around three main themes:

- (1) Parallel models and organizations;
- (2) Fundamentals of parallel algorithms design;
- (3) Main applications of parallel computing.

Important models to be studied include: SIMD, MIMD. Popular parallel organizations to be covered are: Mesh, Binary Tree, Hypertree, Pyramid, Shuffle-Exchange Network, Butterfly, Hypercube, Cube-Connected Cycles, and de Bruijn Network.

Issues of parallel algorithms design to be looked at are: parallel models (PRAM), pin-pointing concurrency, architecture consideration, communications and synchronizations, mapping and scheduling.

For the application areas, we will study (a) Sorting; (b) Dictionary search; (c) Matrix multiplications; (d) Graph algorithm (optional).

### **Course Evaluation:**

Course evaluation will be based on homework assignments and the final exam. There are four to five homeworks. Depending on the availability and usability of the N-Cube machine in the Math lab, one of the homework assignments could involve parallel programming. The final grade is calculated according to the following distribution:

4 to 5 homeworks	60%
Final exam:	40%

**Date/Time of Final Exam (tentative):**

8:00pm – 10:30pm, Friday, July 10, 2009.

**Attendance and Incomplete Policies:**

As a graduate level course, there is no roll call at the beginning of each meeting session. However, it is your responsibility to attend the class and follow the course progress. Regular class attendance is required. **Regularly missing class meetings may adversely affect your final grade.**

The CS Department has a very strict policy and procedure for granting incomplete grades. The instructor has to provide convincing information in writing to the department Chair to get approval. Therefore incomplete will not be granted unless convincing reasons are provided. Reasons such as too much workload are not acceptable for requesting incomplete grade.

**Dropping Classes** (Extracted from [http://www.gradcollege.txstate.edu/Grad\\_Cats/2007-2009.html](http://www.gradcollege.txstate.edu/Grad_Cats/2007-2009.html))

Dropping a class is an official action whereby a student drops one or more courses, yet remains enrolled in at least one other course. Refer to the Registration Instructions at <http://www.registrar.txstate.edu> for details on dropping a class.

**Deadlines.** The deadline for dropping classes or withdrawing from the University is listed on the Registrar's web site at <http://www.registrar.txstate.edu>. When a student drops one or more classes or withdraws from the University, either a "W" or an "F" grade will be assigned for each course as follows:

1. A "W" grade will be assigned automatically if a student officially withdraws from the University or officially drops one or more classes by the "automatic W" Drop/Withdraw deadline.
2. After the automatic "W" period, faculty assign grades to students who officially drop classes or withdraw from the University. Faculty assign a "W" grade only to those students who have a passing average at the time the drop/withdraw action is officially completed. Otherwise, faculty assign an "F" grade.

**Academic Calendar for Summer I, 2009:**

Schedule changes	June 8-9, 2009
Last day to drop a course with refund	June 11, 2009 (ends midnight 06/11/2009)
Deadline for graduation application	June 15, 2009
Last day to drop a class	June 29 (ends 5:00pm 06/29/2009)
Last day to drop with "W" assigned	June 29 (ends 5:00pm 06/29/2009)
Last class day	July 8

**Tentative Schedule:**

1. Introduction and parallel models (Ch. 1)
2. PRAM algorithms (Ch. 2)

3. Processor organizations (Ch. 3)
4. Mapping and scheduling (Ch. 5)
5. Elementary parallel algorithms (Ch. 6)
6. Matrix multiplication (Ch. 7)
7. Sorting (Ch. 10)