CSE4351/5351 Syllabus, Summer II 2018

No: CSE4351-001/5351-001

Title: Parallel Processing

Instructor: Dr. Song Jiang, Associate Professor of the CSE department

Office Hours: M/2-3pm at ERB 101
Office Location: ERB 559
Email: song.jiang@uta.edu
Meeting Time: MoTuWeTh 10:30AM - 12:30PM
Course Meeting Location: LS 101
Web Page: http://ranger.uta.edu/~sjiang/CSE4351-5351-summer-18/index.htm

Course Description: This course is designed to provide seniors and graduate students majored in computer science and engineering with an understanding of fundamentals of parallel and distributed systems. Specific topics to be discussed include: parallel computer architectures including shared memory multiprocessors and scalable multicomputers, common programming paradigms including shared address space and message-passing approaches, and parallel algorithm design including principles and techniques of designing numerical and non-numerical algorithms. The focus in parallel programming will be on both programming expression and programming for performance. Upon completion of this course, students are expected to become familiar with the fundamentals of parallel and distributed computing and obtain skills for making efficient use of the parallel and distributed systems.

Topics:
Overview of parallel/distributed computing, models of parallel computers, parallel software basics, Message Passing Interface (MPI) programming, multithreaded programming using Pthread, design of typical numerical and non-numerical algorithm.

Learning Objectives: Upon successful completion of this course students will be able to

- Understand various parallel architectures, including shared memory, distributed memory, and data parallel architectures.
- Understand major parallel programming models, including shared address space, message passing, and data parallel models.
- Understand major steps in creating a parallel program (decomposition, assignment, orchestration, and mapping) and their performance implications.
• Understand major sources of overheads due to parallelism and basic techniques to reduce the overheads.
• Write MPI programs with correct use of synchronous/asynchronous communications.
• Write Pthread and OpenMP programs with correct use of mutual exclusion techniques.
• Use basic analytical modeling techniques to analyze parallel systems’ performance.

Course Prerequisites

It is assumed that you have background of computer architecture and are familiar with C programming. If you feel that your background is lacking in some of these areas, and are not sure whether this course is suitable to you, please come to talk with your instructor.

Course Textbook:

A. Grama, A. Gupta, G. Karypis, and V. Kumar, Introduction to Parallel Computing, (2nd Ed), Addison Wesley, 2003 or later versions

(Recommended)

The materials to be presented in the course will be complemented by additional reference books, programming manuals and tutorials. Many of them are available on-line, and will be available on the course web page. In addition, other course materials, including lecture notes, problem sets and reading papers, will also be posted.

Each student need to sign up an account at TACC portal https://portal.tacc.utexas.edu/account-request using his/her UTA email for course lab projects.

Class Attendance

Attendance is required and may be taken.

Grading Policy

Grading scale
1) A: [90, 100]
2) B: [80, 90)
3) C: [70, 80)
4) D: [60, 70)
5) F: below 60

Distribution of Points:

1) In-class discussion and attendance: 10%
2) Homework assignments: 30%
3) Projects: 30%
4) Final exam: 30%

Makeup Exam and Makeup Assignment Policy: No make-up exams will be given except for university sanctioned excused absences. If you will miss an exam (for a good reason), it is your responsibility to contact instructor before the exam.

Late Policy: Overdue submissions will not be accepted.

Course Policy

Americans with Disabilities Act

The University of Texas at Arlington is on record as being committed to both the spirit and letter of federal equal opportunity legislation; reference Public Law 93112 -- The Rehabilitation Act of 1973 as amended. With the passage of new federal legislation entitled Americans With Disabilities Act - (ADA), pursuant to section 504 of The Rehabilitation Act, there is renewed focus on providing this population with the same opportunities enjoyed by all citizens. As a faculty member, I am required by law to provide "reasonable accommodation" to students with disabilities, so as not to discriminate on the basis of that disability. Student responsibility primarily rests with informing faculty at the beginning of the semester and in providing authorized documentation through designated administrative channels.

Academic Integrity

It is the philosophy of The University of Texas at Arlington that academic dishonesty is a completely unacceptable mode of conduct and will not be tolerated in any form. All persons involved in academic dishonesty will be disciplined in accordance with University regulations and procedures. Discipline may include suspension or expulsion from the University. "Scholastic dishonesty includes but is not limited to cheating, plagiarism, collusion, the submission for credit of any work or materials that are attributable in whole or in part to another person, taking an examination for another person, any act designed to give unfair advantage to a student or the attempt to commit such acts." (Regents' Rules and Regulations, Part One, Chapter VI, Section 3, Subsection 3.2, Subdivision 3.22)
**Drop Policy**

Students may drop or swap (concurrently add and drop) classes through MyMav self-service throughout the registration period. After the late-registration period, students must see their academic advisor to drop a class or withdraw. Undeclared students must see an advisor in the University Advising Center. Drops can continue through a point two-thirds of the way through the term or session. It is the student’s responsibility to officially withdraw, if he/she does not plan to attend after registering.

**Emergency Exit Procedures**

Should we experience an emergency event that requires us to vacate the building, students should exit the room and move toward the nearest exit. When exiting the building during an emergency, one should never take an elevator but should use the stairwells. Faculty members and instructional sta_ will assist students in selecting the safest route for evacuation and will make arrangements to assist individuals with disabilities. How best to exit the building will be explained on day one. (See also http://www.uta.edu/campus-ops/ehs/fire/Evac_Maps_Buildings.php and http://www.uta.edu/police/EvacuationProcedures.pdf.)

**Student Support Services**

UT Arlington provides a variety of resources and programs designed to help students develop academic skills, deal with personal situations, and better understand concepts and information related to their courses. Resources include tutoring, major-based learning centers, developmental education, advising and mentoring, personal counseling, and federally funded programs. For individualized referrals, students may visit the reception desk at University College (Ransom Hall), call the Maverick Resource Hotline at 817-272-6107, send a message to resources@uta.edu, or view the information at http://www.uta.edu/universitycollege/resources/index.php.