

Pellissippi State Community College
Master Syllabus

**INTRODUCTION TO CLUSTER COMPUTING
CSIT 1360**

Class Hours: 3.0
Laboratory Hours: 3.0
Credit Hours: 4.0
Revised: Fall 2009

Instructor:
Office:
Phone:
E-mail:

Catalog Course Description:

Parallel computing fundamentals including models of parallel computing, architecture taxonomy, memory architecture, performance, design, and scalability considerations, parallel programming paradigms, techniques and issues in parallel program creation and parallel programming examples.

Entry Level Standards:

College level reading and math skills; keyboarding skills of at least 20 wpm; familiarity with computer architecture and competent in at least one high-level programming language and basic knowledge of UNIX or Windows operating system

Prerequisites: CSIT 2410 or user level Linux/Unix experience.

Corerequisites: CSIT 1730 or consent of the instructor.

Textbook(s) and Other Reference Materials Basic to the Course:

None.

I. Week/Unit/Topic Basis:

Week	Topic
1	Introduction
2	Taxonomy of Parallel Architectures
3	Taxonomy of Parallel Architectures
4	Interconnection Networks
5	Performance Metrics for Parallel Systems
6	Effects of Granularity, Data Mapping and Communication Overheads
7	Scalability of Parallel Systems
8	Process Scheduling, Load Balancing and Sharing
9	Parallel Programming Paradigms
10	Shared-Address-Space Paradigm
11	Message Passing Paradigm
12	Parallel Algorithms
13	Parallel Algorithms – Basic Communication Operations
14	Parallel Tools, Compilers and Libraries
15	Comprehensive Final Exam

II. Course Objectives:*

- A. Analyze different parallel architecture and parallel programming alternatives available in getting hardware and software. II III IV
- B. Demonstrate through group discussion how to approach a problem and come up with different solutions. IV V
- C. Use search tools, inquiries, and on-line resources on the Internet to locate, use, download, upload and communicate effectively. I II III
- D. Develop skills to analyze parallel system using performance, scalability and design parameters. I II III IV V XI
- E. Demonstrate individual and teamwork standards to complete assigned tasks. III V X
- F. Develop skills to understand, use and analyze wide variety of parallel tools, and applications. I II III IV IX
- G. Demonstrate efficiency in evaluating different parallel models of computations. I II
- H. Implement and apply current developments in the field of high performance computing. I III IX

III. Instructional Processes:*

Students will:

- 1. Develop an ability to analyze parallel architectures, programming paradigms and applications. *Communication Outcome, Technological Literacy Outcome, Mathematics Outcome, Transitional Strategies, Active Learning Strategies*
- 2. Demonstrate skills to evaluate performance, design and scalability parameters associated with parallel systems. *Mathematics Outcome, Technological Literacy Outcome, Active Learning Strategies*
- 3. Produce a fully working end-product as part of a collaborative effort for sharing with other class members. *Communication Outcome, Transitional Strategies, Active Learning Strategies*
- 4. Use the Internet as a medium for obtaining documentation and instruction and for submitting assignments. *Communication Outcome, Technological Literacy Outcome, Transitional Strategies*
- 5. Practice elements of the work ethic such as punctuality, professionalism, dependability, cooperation, and contribution. *Active Learning Strategies*
- 6. Participate in a peer review of term projects. *Communication Outcome, Transitional Strategies, Active Learning Strategies*

*Strategies and outcomes listed after instructional processes reference Pellissippi State's goals for strengthening general education knowledge and skills, connecting coursework to experiences beyond the classroom, and encouraging students to take active and responsible roles in the educational process.

IV. Expectations for Student Performance:*

Upon successful completion of this course, the student should be able to:

- 1. Demonstrate an ability to understand basic terminology and general concepts associated parallel systems. A, D, F, G
- 2. Evaluate and analyze parallel models of computation. A, G
- 3. Find resources and information to perform specific tasks. B, C

4. Understand different parallel programming paradigms. A, D, F
5. Use fundamental parallel applications, utilities, and tools. D, F, H
6. Develop an understanding of different alternative solutions to a given problem and cost/benefit analysis associated with each. A, D, F
7. Use Internet and communication tools effectively. C, E
8. Produce documentation, sources of information, and reports in a timely, well-organized manner. C, E, H
9. Demonstrate skills to understand hardware and software issues in high performance computing field in general and suggest innovative solutions. A, D, F, G, H

*Letters after performance expectations reference the course objectives listed above.

V. **Evaluation:**

A. Testing Procedures

Three tests will be given during the course of the semester. There will be no make-up tests unless prior arrangements have been made with the instructor. Failure to make a passing test average may result in a grade of F for the course.

B. Laboratory and Project Expectations

At least 4 lab assignments will be given during the course of the semester. In addition, students may be assigned a team project. A late penalty will be imposed on any overdue assignment. Failure to make a passing average in lab assignments and team project may result in a grade of F for the course.

C. Grading Scale:

93 – 100	A
88 – 92	B+
83 – 87	B
78 – 82	C+
73 – 77	C
65 – 72	D
Below 65	F

VI. **Policies:**

A. Attendance Policy:

Pellissippi State Community College expects students to attend all scheduled instructional activities. As a minimum, students in all courses must be present for at least 75 percent of their scheduled class and laboratory meetings in order to receive credit for the course. [NOTE: No differentiation is noted for excused/unexcused absences. These will be treated as an absence.] (Pellissippi State, 2008-2010 Catalog, <http://pstcc15.pstcc.edu/catalog>, page 83)

B. Academic Dishonesty:

Plagiarism, cheating, and other forms of academic dishonesty are prohibited. Students guilty of academic misconduct, either directly or indirectly through participation or assistance, are immediately responsible to the instructor of the class. In addition to other possible disciplinary sanctions which may be imposed through the

regular Pellissippi State procedures as a result of academic misconduct, the instructor has the authority to assign an F or a zero for the exercise or examination or to assign an F in the course. (Pellissippi State, 2008-2010 Catalog, <http://pstcc15.pstcc.edu/catalog>, pages 61-62)

C. Computer Usage Guidelines:

College-owned or –operated computing resources are provided for use by students of Pellissippi State. All students are responsible for the usage of Pellissippi State’s computing resources in an effective, efficient, ethical and lawful manner. (Pellissippi State, 2008-2010 Catalog, <http://pstcc15.pstcc.edu/catalog>, pages 66-69)

D. Students with Disabilities:

Students who need accommodations because of a disability, have emergency medical information to share, or need special arrangements in case the building must be evacuated should inform the instructor immediately, privately after class or in her or his office. Students must present a current accommodation plan from a staff member in Services for Students with Disabilities (SSWD) in order to receive accommodations in this course. Services for Students with Disabilities may be contacted by going to Goins 134 or 126 or by phone: 694-6751(Voice/TTY) or 539-7153. More information is available at www.pstcc.edu/departments/swd/