PELLISSIPPI STATE TECHNICAL COMMUNITY COLLEGE
MASTER SYLLABUS
HPC Architecture & System Administration
HPC 2300

Class Hours: 3.0  Credit Hours: 4.0
Laboratory Hours: 3.0  Date Revised: Fall 04

Catalog Course Description:
This course reviews microprocessors. Topics include classification and management of clusters, an in-depth study of the system board components and memory management, supporting input and output devices, troubleshooting and disaster recovery techniques, working with high speed networks, distributed and shared memory systems, hardware design issues, vector parallel machines and communication issues of remote massively parallel machines and clusters, and the assembly and maintenance of PC clusters.

Entry Level Standards:
College level reading and math skills; keyboarding skills of at least 20 wpm; familiarity with the personal computer and an introduction to the Linux operating system; problem solving skills essential.

Prerequisite(s):
CSIT 2461 or Consent of instructor

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

I. WEEK/UNIT/TOPIC BASIS:

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<thead>
<tr>
<th>Week</th>
<th>Unit</th>
<th>Topic</th>
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<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>Course Overview and Introduction to High Performance Computing</td>
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<tr>
<td>2</td>
<td>2</td>
<td>An Overview of PC Cluster Computing</td>
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<td>3</td>
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<td>Taxonomy and Architecture of Clusters</td>
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<td>4</td>
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<td>Cluster Node Hardware</td>
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<td>5</td>
<td>4</td>
<td>Cluster Operating Systems - Linux</td>
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<td>6</td>
<td>5, 6</td>
<td>Network Hardware and Software</td>
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<td>7</td>
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<td>PC Cluster Planning and Design</td>
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<td>8</td>
<td>7</td>
<td>PC Cluster Installation and Configuration</td>
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<tr>
<td>9</td>
<td>-</td>
<td>PC Cluster Distributions</td>
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<tr>
<td>10</td>
<td>-</td>
<td>PC Cluster Distributions</td>
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<tr>
<td>11</td>
<td>9, 11</td>
<td>Parallel Software Installation and Configuration – MPI, PVM</td>
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<td>12</td>
<td>8</td>
<td>Cluster Performance Benchmarks and Metrics</td>
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<td>Cluster Workload Management</td>
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<td>14</td>
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<td>PBS: Portable Batch System</td>
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<td>15</td>
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<td>Final Exam</td>
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II. COURSE OBJECTIVES*:

A. Illustrate understanding of various personal computer processors, architectures, and busses and their interchangeability or lack of it in a cluster environment. II III IV

B. Participate in a group project to build, configure and operate a cluster. III IV

C. Working knowledge of and hands-on experience in troubleshooting basic PC and cluster problems. III IV V

D. Use knowledge of and hands-on experience in basic up-grading and reconfiguring a PC. III IV V

E. Demonstrate working knowledge of and hands-on experience in up-grading and reconfiguring a cluster. I II III IV V

*Roman numerals after course objectives reference goals of the Computer Science and Information Technology
III. INSTRUCTIONAL PROCESSES*:

Students will:
1. Use professional tools to produce a PC cluster with documentation. **Technological Literacy Outcome, Personal Development Outcome, Transitional Strategy**
2. Learn to analyze and solve problems using structured analytical techniques. **Technological Literacy Outcome, Numerical Literacy Outcome, Personal Development Outcome, Problem Solving and Decision Making Outcome, Active Learning Strategy**
3. Use professionally accepted methods and materials in completion of HPC cluster project. **Technological Literacy Outcome, Personal Development Outcome, Transitional Strategy**
4. Practice elements of the work ethic such as punctuality, professionalism, dependability, cooperation, and contribution. **Personal Development, Transitional Strategy**

*Strategies and outcomes listed after instructional processes reference TBR’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. Explain the processes of maintaining an inventory of cluster hardware/upgrades and a log of cluster problems and repairs. **A, B, C, D, E**
2. Diagnose various problems encountered in the cluster and repair or replace hardware components as needed. **D, E**
3. Analyze and evaluate the components of various architectures and buses and their advantages and disadvantages in the cluster environment. **D, E**
4. Describe various microprocessors and their relative advantages to a particular job or application. **D, E**
5. Describe and decide the kind of hardware and configuration necessary for a particular cluster. **E**
6. Identify the function of various cluster hardware components and their interchangeability or lack of it. **B, C, D, E**

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

V. EVALUATION:

A. Testing Procedures:

Two tests will be given during the course of the semester. Each test will be of 100 points. There will be no make-up tests unless prior arrangements have been made with the instructor. Quizzes will be given for almost every chapter covered. Quizzes may only be made up for excused absences. An excused absence is one that can be verified by supporting documentation. Failure to make a passing quiz average may result in a grade of F for the course.

B. Laboratory Expectations:

Lab assignments will be given during the course of the semester. A late penalty may be imposed on any overdue assignment. In addition, a team project may be assigned to emphasize team learning and group participation. Failure to satisfactorily complete any lab assignment and team project may result in a grade of F for the course.

C. Field Work:

N/A

D. Other Evaluation Methods:

This information, if applicable, will be provided by the instructor in full detail during the first week of class via syllabus supplement.

E. Grading Scale:

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<tr>
<th>Score Range</th>
<th>Grade</th>
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<tr>
<td>93 – 100</td>
<td>A</td>
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VI. POLICIES:

A. Attendance Policy:

Pellissippi State Technical 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, 2004-2006 Catalog, page 83)

B. Academic and Classroom Misconduct:

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, 2004-2006 Catalog, pages 62-63)

C. Accommodations for disabilities:

If you need accommodation because of a disability, if you have emergency medical information to share, or if you need special arrangements in case the building must be evacuated, please inform the instructor immediately. Privately after class or in the instructor's office.

To request accommodations students must register with Services for Students with Disabilities: Goins 127 or 131, Phone: (865) 539-7153 or (865) 694-6751 Voice/TDD.

D. Computer Usage Policies:

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, 2004-2006 Catalog, pages 67-70)