HPC IMAGE PROCESSING & ANALYSIS
HPC 2800

Class Hours: 3.0       Credit Hours: 3.0
Laboratory Hours: 0.0   Revised: Spring 03

NOTE: This course is not designed for transfer credit.

Catalog Course Description:
Provides training in the use of advanced image and raster analysis tools in the high performance computing (HPC) environment, including the development and use of applications to divide, distribute the analysis and recombine image data in a final result. Students will also be trained to use commercially available and public domain tools to analyze, combine and visualize complex image data.

Entry Level Standards:
College level reading and math skills; keyboarding skills of at least 20 wpm; knowledge and experience working in the Linux operating system and the parallel computing environment.

Prerequisites:
None

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

I. Week/Unit/Topic Basis:

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<thead>
<tr>
<th>Week</th>
<th>Topic</th>
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<tbody>
<tr>
<td>1-15</td>
<td>TBA</td>
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<tr>
<td>16</td>
<td>Final Exam Period</td>
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II. Course Objectives*:

A. Understand basic image and raster image properties. I, II, IV

B. Understand the relationships between image and raster properties and the electromagnetic spectrum. I, II, IV

C. Understand how to divide the image analysis problem in order to make efficient use of parallel processing technology and tools **

D. Understand how to modify the application of image processing and analysis tools in order to accomplish the goals of the analysis task**

E. Understand how to extend the skills and knowledge of successful image processing and
analysis applications to different disciplines with different analysis goals. **

*Roman numerals after course objectives reference goals of the HPC program.

**III. Instructional Processes***:

Students will:

1. **Use spatial elements, measurements, locations and references to develop graphic and numerical awareness of the real world. Understand how information in the form of images connect to the physical world. Numerical Literacy Outcome, Transitional Strategy.**

2. **Be familiar with the basic procedures and the overall quality of image databases. Numerical Literacy Outcome, Problem Solving and Decision Making Outcome.**

3. **Participate in open discussions regarding the strengths and weaknesses of image analysis procedures and what improvements might be made in future releases. Active Learning Strategies, Communication Outcome, Transitional Strategy.**

4. **Use the Internet and electronic mail to communicate effectively between the instructor, other students, and for information gathering. Technological Literacy Outcome, Information Literacy Outcome.**

5. **Internalize the work ethic by demonstrating regular attendance, punctuality, dependability, cooperation with teachers and peers, and professionalism. Personal Development Outcome.**

*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. **Use advanced HPC software and tools to analyze image data. A, B, C, D**

2. **Demonstrate unsupervised classification of multispectral image data. A, B**

3. **Demonstrate supervised classification of multispectral image data. A, B**

4. **Use HPC tools to combine and register image data. A, C, D**

5. **Demonstrate problem solving ability in analyzing image data. A, B, C, E**

6. **Use 3-D software tools to visualize combined and registered image data. A, B, C**

7. **Create hard-copy output of analyzed image. A, B**

8. **Demonstrate the ability to use HPC tools to divide the image analysis problem. A, C, D, E**

9. **Demonstrate the ability to balance the image processing load between processors in the HPC cluster used. A, C, D**

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

A. Testing Procedures: 65% of grade

Two tests will be administered (one test plus the final) counting for approximately 65% of the final grade.

B. Laboratory Expectations: 35% of grade

Students will be assigned group and/or individual projects. The ability to work with others, the ability to make efficient use of equipment, and the level at which students perform will contribute to the grade.

C. Field Work:

N/A

D. Other Evaluation Methods:

N/A

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.

B. Academic Dishonesty:

Plagiarism, cheating and other forms of academic dishonesty are prohibited. A student guilty of academic misconduct, either directly or indirectly through participation or assistance, is immediately responsible to the instructor of the class. In addition to other possible disciplinary sanctions that may be imposed through the regular Pellissippi State procedures as a result of academic misconduct, the instructor has the authority to assign an F for the exercise or examination or to assign an F in the course.

C. Other Policies:

Any act of misuse, vandalism, malicious or unwarranted damage or destruction, defacing, disfiguring, or unauthorized use of property/equipment belonging to Pellissippi State is subject to disciplinary sanction.