Essential information.

Instructor        Dr. Adrian Sandu
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• E-mail          sandu@cs.vt.edu
• Office          Torgersen 3060E
• Zoom            https://virginiatech.zoom.us/my/asandu7
• Office hours    TBA

Teaching Assistant TBA

Lecture           Tu-Th 12:30pm –1:45pm, 240 (DD&S)
Web Page          http://people.cs.vt.edu/~asandu/Courses/CS4234/CS4234.html
Prerequisites     CS–3214
Final Exam        Section: 12T, December 13, 2023, 1:05pm–3:05pm

Recommended Textbook.


Additional References for Parallel Algorithms and Design.


Additional References for Parallel Programming.

• “The MPI Standard”.
• “The MPI Complete Reference”.
• “The OpenMP Specifications”.
• “Introduction to OpenMP”
About the course.

This class will introduce the fundamental concepts of parallel computing. Topics include a survey of parallel computer architectures, models of parallel computation, and interconnection networks; parallel algorithm development and analysis; programming paradigms and languages for parallel computation; example applications; performance measurement and evaluation.

Topics.

<table>
<thead>
<tr>
<th>Week</th>
<th>Topics</th>
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<tr>
<td>Weeks 2–3</td>
<td>Shared memory programming. Race conditions. OpenMP and applications.</td>
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<tr>
<td>Weeks 4–7</td>
<td>Message passing programming. The Message Passing Interface (MPI) and applications.</td>
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<td>Weeks 8–9</td>
<td>Principles of parallel algorithm design: tasks, dependency graphs, mappings. Decomposition techniques: embarrassingly parallel, data decomposition, pipelined computations, etc.</td>
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<td>Week 10</td>
<td>Analytical modeling of parallel programs. Performance metrics and parallel performance analysis.</td>
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<td>Week 11</td>
<td>Non-numerical applications. Floyd’s algorithm. Sorting.</td>
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<tr>
<td>Weeks 14–15</td>
<td>Additional topics: programming heterogeneous multi-core architectures like graphics processing units (GPUs)</td>
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Grading.

For students registered for CS4234 the grade will be based on:

25% Mid-term exam  
25% Final exam  
50% Homework (theoretical and programming assignments)

Disclaimer.

Some information given to you in class may supersede the information in this syllabus or on the web page.

Student Complaints and Academic Misconduct.

Students are expected to comply to the Honor Code. If you have any problems, the first step is to discuss with me directly.

Special Arrangements.

Please let me know if you have a documented condition which requires special arrangements.