## CS-5234 (CRN 13534)

# Advanced Parallel Computation

**Spring 2024**

## Quick Info

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**Topics:** This class discusses 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. If time permits, we may discuss additional topics as well.

**Lecture:** Tue-Thu 11am-12:15pm, 1770 Litton-Reaves Hall (LITRV).

**Exam:** Section 15T, May 9, 2022, 7:45am--9:45am.

**Instructor:** Prof. Adrian Sandu

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Office hours: By appointment.

Zoom: https://virginiatech.zoom.us/my/asandu7

**Prerequisites:**

CS 3204  (Operating Systems)

Programming in C

Graduate standing or permission of the instructor

**Main Textbooks:**

* [Thomas Rauber and Gudula Runger:](https://link-springer-com.ezproxy.lib.vt.edu/book/10.1007%2F978-3-642-37801-0)

[“Parallel programming for multicore and cluster systems”,](https://link-springer-com.ezproxy.lib.vt.edu/book/10.1007%2F978-3-642-37801-0) Springer-Verlag Heidelberg, 2013, 516 pages. Available through VT library.

* [Ananth Grama, George Karypis, Vipin Kumar, and Anshul Gupta: "Introduction to Parallel Computing".](https://www.amazon.com/Introduction-Parallel-Computing-Ananth-Grama/dp/0201648652)656 pages, ISBN 0202248652, Addison-Wesley, 2003. Instructor will provide notes.

**Grading:**

The grade is based on homework projects, and in-class presentations about the project results.

**Syllabus:**    
For detailed information please consult the syllabus ([PDF](http://www.cs.vt.edu/~asandu/Courses/CS5234/syllabus5234.pdf)).

## Homework

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**Please** check the [list of assignments](http://www.cs.vt.edu/~asandu/Courses/CS5234/Homework/homework.html).

## Additional Materials

* [MPICH](http://www.mpich.org)
* [Open MPI](https://www.open-mpi.org)
* [The OpenMP page](http://www.openmp.org)
* [MPI 3.0 standard (2012)](http://www.mpi-forum.org/docs/mpi-3.0/mpi30-report.pdf)
* [MPI tutorial at LLNL](https://computing.llnl.gov/tutorials/mpi/)
* Ian Foster, [Designing and Building Parallel Programs](http://www-unix.mcs.anl.gov/dbpp/).

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http://www.cs.vt.edu/~asandu/Courses/CS5234/CS5234.html