

AMSC/CMSC 663-664: Advanced Scientific Computing I-II

2016 fall – 2017 spring

Syllabus

Class: 2016 Fall: TuTh, 9:30am – 10:45am, CSIC 4122
2017 Spring: TuTh, 11:00am – 12:15pm, AVW 3258

Instructors and Contact Information:

- Kayo Ide: ide@umd.edu, (AOSC) CSS Building, Room 3403, x50591 / (CSCAMM) CSIC Building, Room 4127, x50162
- Howard Elman: elman@cs.umd.edu, AVW Building, Room 3125, x52694

Office Hours: by appointment

Course www: http://aosc.umd.edu/~ide/index_teaching_ams663-664.php

Course objectives:

AMSC/CMSC 663-664 is a two-semester project course in which each student will identify and carry out own scientific computing project with focus on:

- Understanding of scientific computing algorithms related to the project
- Code Development, including
 - Modularity, portability, memory management
 - Post-processing, restarting, and writing to databases
 - Interactivity
 - Scientific visualization
 - Documentation and version management tools
 - Debugging and profiling tools
 - Validation
- Verification using test problems
- Time permitting, additional considerations may be given, for example implementation of parallel algorithms: OpenMP, MPI, GPU programming; Masking communication costs, load balancing, granularity; parallel numerical linear algebra

Milestones and Time Line:

- Project formulation [2016 September]
 - Each student must:
 - Find a project advisor
 - Identify a suitable project that includes a deliverable suite of software designed to carry out a scientific computing task
 - Propose appropriate algorithms, languages, and platforms for the development of this software
 - Each student should meet with both instructors and project advisor to agree on the project formulation.

- Project proposal: Oral presentation and written documentation
 - Proposal materials should serve as the foundation for future reports
 - Oral presentation [2016 late September to mid October]
 - Plan on 30min including questions and discussion
 - The project advisor must be present
 - Written document [shortly after oral presentations]
 - At least 5 pages and longer as needed
- Weekly report, throughout the duration of AMSC/CMSC 663-664
 - Due Friday 11:59pm
- Mid-year progress report: Oral presentation and written document
 - Update on the project status
 - Report on how the software has been developed and tested so far, against the proposed milestone and timeline
 - Current vision of the complete product
 - Details of how that vision has evolved over the course of the project
 - Oral presentation: [2016 late November to early December]
 - Plan on 30min including questions and discussion
 - The project advisor must be present
 - Written document [shortly after oral presentation]
- Status report: Oral presentation only [2017 February]
 - Update on the project status
 - Target towards the completion of the project at the end of the semester
 - Plan on 30min including questions and discussion
 - The project advisor is welcome, but not required, to attend
- Final project report: Oral presentation and written document
 - Complete report on the project
 - Report on how the software has been developed and tested, against the proposed (initial) milestone and timeline
 - Discussion of the results obtained by the project
 - Summary of the project and future directions if appropriate
 - Discussion of deliverables
 - Oral presentation: [2017 late April to early May]
 - Plan on 30min including questions and discussion
 - The project advisor must be present
 - Written document [shortly after oral presentations]
 - Deliverables [with the written document]

Class Attendance by Project Advisor:

During AMSC/CMSC 663-664, individual project advisor is required to attend a total of three oral presentations, in addition to three-way meeting for project formulation

- Project proposal: mid October
- Mid-year progress: late November to early December
- Final: late April to early May

Student Responsibility and Grading Policy:

- Students are responsible for achieving the project goals that were listed in the proposal.
- If any difficulty arises with the project, it is student's responsibility to communicate with the instructors and seek for the resolution in a timely manner.
- It is individual student's responsibility to secure the attendance of the project advisor.
- Grading takes into account all aspect of the project execution, including student's understanding of mathematics and algorithms involved in the project, its implementation including validation and verification, timing of the weekly reports, oral presentation quality, written document quality, overall understanding and discussion of the final results, deliverables, execution according to the proposed milestone, as well as the class attendance and communication with the project advisor.

Guidance to Proposal & Reports:

- Proposal and reports consists of:
 0. Cover page material: Project Title; Name; Advisor Name with Unit; Date of Submission; Abstractfollowed by sections that describe, define, explain, and discuss:
 1. Brief introduction & background
 2. Project goal
 3. Outline of overall approach to the project
 4. Scientific computing algorithms
 5. Implementation, including
 - Language
 - Computational facilities to be used
 - Databases to be used
 6. Validation methods
 7. Test problems for verification
 8. Expected results (later on discussion)
 9. Milestone
 10. Deliverables
 11. Reference
- In both oral presentation and written document,
 - Proper credits must be given to any references, including online materials
 - DO NOT cut-and-paste; plagiarism is a very serious offense at UMD and in any academic/scientific/engineering community.
- Submit presentation and documentation files
 - In .pdf, to avoid conversion issues among platforms;
 - In 3-days advance as draft; the instructors may request an early submission if needed.