The Hong Kong University of Science and Technology (Guangzhou)

DSAA3032 Course Syllabus

Course Title: Introduction to High-Performance and Parallel Computing

Course Code: DSAA 3032

Number of Credits: [3 Credits]

Pre-requisites: DSAA 2031 AND UFUG 2601

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Course Description

This course introduces the fundamentals of high-performance and parallel computing. It targets scientists, engineers, scholars, and everyone seeking to develop the software skills necessary for work in parallel software environments. These skills include big data analysis, machine learning, parallel programming, and optimization. The course covers the basics of Linux environments and bash scripting, all the way to high-throughput computing and parallelizing code. The methods of instruction include weekly lectures and lab sessions. The assessment includes programming assignments and a written final exam.

Intended Learning Outcomes (ILOs)

By the end of this course, students should be able to:

ILO-1. Explain the principles of designing efficient parallel and distributed programs.

ILO-2. Apply Linux command line skills for writing, compiling and debugging programs

ILO-3. Create programs to run on multi-core processors using OpenMP

ILO-4. Appropriate use of programming multiple machine clusters using MPI

ILO-5. Analyze parallel programs theoretically and the maximum speedup

Assessment and Grading

This course will be assessed using criterion-referencing and grades will not be assigned using a curve. Detailed rubrics for each assignment are provided below, outlining the criteria used for evaluation.

Assessments:

Assessment Task	Contribution to Overall Course grade (%)	Due date
Programming Assignment 1	15%	24/10/2025
Programming Assignment 2	15%	14/11/2025
Programming Assignment 3	20%	05/12/2025
Final examination	50%	TBD

* Assessment marks for individual assessed tasks will be released within two weeks of the due date.

Mapping of Course ILOs to Assessment Tasks

Assessed Task	Mapped ILOs	Explanation
Programming Assignment 1	ILO2, ILO3	

		This task assesses OpenMP programming, test, and debug on Linux platforms.
Programming Assignment 2	ILO2, ILO4	This task assesses MPI programming, test, and debug on Linux platforms.
Programming Assignment 3	ILO2, ILO3, ILO4	This task assesses both OpenMP and MPI programming, test, and debug on Linux platforms.
Final exam	ILO1, ILO3, ILO4, ILO5	The final exam assesses both programming skills and knowledge about design principles and performance analysis.

Grading Rubrics

Detailed rubrics for each assignment will be provided. These rubrics clearly outline the criteria used for evaluation. Students can refer to these rubrics to understand how their work will be assessed.

Final Grade Descriptors:

Grades	Short Description	Elaboration on subject grading description
A	Excellent Performance	Demonstrates a comprehensive grasp of subject matter and expertise in problem-solving. Exhibits a high capacity for scholarship, going beyond core requirements to achieve learning goals.
B	Good Performance	Shows good knowledge and understanding of the main subject matter, competence in problem-solving, and the ability to analyze and evaluate programs. Displays high motivation to learn and the ability to work independently.
C	Satisfactory Performance	Possesses adequate knowledge of core subject matter, competence in dealing with familiar problems, and some capacity for analysis. Shows persistence and effort to achieve broadly defined learning goals.
D	Marginal Pass	Has threshold knowledge of core subject matter, potential to achieve key professional skills, and the ability to make basic judgments. Benefits from the course and has the potential to develop in the discipline.
F	Fail	Demonstrates insufficient understanding of the subject matter and lacks the necessary problem-solving skills. Shows limited ability to think critically or analytically and exhibits minimal effort towards achieving learning goals. Does not meet the threshold requirements for professional practice or development in the discipline.

Course AI Policy

We advise students not to copy code from GenAI tools in their programming assignments. We will conduct code similarity checking. No GenAI tools will be used in the final exam, as the final exam is closed book and in person.

Communication and Feedback

Assessment marks for individual assessed tasks will be communicated via Canvas within two weeks of submission. Feedback on assignments will include citing specific grading criteria for point deduction. Students who have further questions about the feedback including marks should consult the instructor within five working days after the feedback is received.

Resubmission Policy

There will be no resubmission of programming assignments. A change of grading scheme for individual students will be rare and on a case-by-case basis.

Required Texts and Materials

An Introduction to Parallel Programming, 2nd edition. Peter S. Pacheco and Matthew Malensek. Morgan Kaufmann, 2022.

The reference book, together with slides and demonstration source code, is available online:

https://www.cs.usfca.edu/~peter/ipp2/

Academic Integrity

Students are expected to adhere to the university's academic integrity policy. Students are expected to uphold HKUST(GZ)'s Academic Honor Code and to maintain the highest standards of academic integrity. The University has zero tolerance of academic misconduct. Please refer to Regulations for Academic Integrity and Student Conduct for the University's definition of plagiarism and ways to avoid cheating and plagiarism.

Additional Resources

Online resources about OpenMP and MPI standard specifications, tutorials, and discussion forums.