

CSCI-GA.3033-004
Graphics Processing Units (GPUs): Architecture and Programming
Fall 2016

Instructor: Prof. Mohamed Zahran (mzahran@cs.nyu.edu)

Meeting time: Tuesdays 5:10pm – 7:00pm

Meeting place: WWH 317

This course examines the architecture and capabilities of modern GPUs (graphics processing unit). Many computations can be performed faster on the GPU than on a traditional CPU. This is why GPUs exist now in almost all computers (from tablets to supercomputers); and the majority of Top 500 supercomputers in the world are built around GPUs. GPUs are now used for a diverse set of applications not only traditional graphics applications; which introduces the concept of general-purpose GPUs or GPGPUs.

In this course, we will cover architectural aspects of modern GPUs. We will also learn how to program GPUs to solve different type of problems and how to make the best use of the underlying hardware.

Topics Covered:

- Why GPUs
- GPU Architecture
- GPU-CPU Interaction
- GPU programming model
- GPU benchmarking
- CUDA
- OpenCL
- Multi-GPU settings
- Solving real-life problems using GPUs

The grade will be distributed among homework assignments, programming assignments, and a final exam, as follows:

- Homework assignment: 15%
- Programming assignments: 30%
- Project 25%
- Final exam: 30%

Text:

Title: **Programming Massively Parallel Processors: A Hands-on Approach**
2nd Edition

Authors: David B. Kirk and Wen-mei W. Hwu

Publisher: Morgan Kaufmann

Year: 2013

ISBN: 9780124159921

Feedback: I would like as much feedback/criticisms as possible from you, as early as possible, so that I can try to improve the way the course is taught. Please feel free to give me any suggestions (anonymously if you wish) that you think could improve the way the course is handled. Keep in mind that you are not alone. If you have a question, undoubtedly others do too; and we will all benefit from your input. Do not be shy to ask about anything you do not understand in the course.

Good Luck and Have fun!