



THE OHIO STATE UNIVERSITY
COLLEGE OF ENGINEERING

Scientific Computing on Emerging Architectures

ECE 7861

Credit Hours:

3.00 - 3.00

Course Levels:

Graduate (5000-8000 level)

Course Components:

Lecture

Course Description:

Introduction to the architectural system design of emerging architectures and techniques for managing idiosyncrasies of these architectures for developing scientific computing applications.

Prerequisites and Co-requisites:

Prereq: 5362, 762, CSE 2431, or 5431.

Course Goals / Objectives:

- Introduce the architecture and system design of emerging architectures
 - Learn techniques for managing architectural idiosyncrasies and programming difficulties associated with these architectural qualities
 - Learn how to best augment/alter the designs of these systems to minimize the programming cost of future revisions of the hardware
 - Introduce students to emerging architectures, such that they become exposed to the exciting developments in the field
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Course Topics:

- Introduction to emerging architectures
 - GPU programming with CUDA – threads, registers, streaming operations
 - CUDA hardware review - memory system overview
 - CUDA optimizations - memory, control flow, floating point math
 - Student paper presentations
 - Heterogeneous multicore CPUs - case study: Cell BE Architecture
 - Optimizations for heterogeneous multicore CPUs - double buffering, SIMD, branch elimination
 - Programming heterogeneous platforms with OpenCL
 - Multithreaded architectures - performance analysis and optimizations
 - Application case studies
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Designation:

Elective