

# Sixth Annual Iowa High Performance Computing Summer School

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Department of Physics and Astronomy  
University of Iowa

2523 UCC Training Room  
University of Iowa  
1-3 June 2015



# Thank you



Ben Rogers  
Glenn Johnson  
Mary Grabe  
Sai Ramadugu  
Brenna Miller  
Tino Kaltsis  
Ben Rothman

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**National Science Foundation**

# Outline

- Welcome and Introductions
- Aims of this Summer School
- Comments
- Getting Online

# Faculty



The IHPC 2015 Summer School is taught by three faculty members

**Professor Gregory Howes**

Department of Physics and Astronomy  
University of Iowa

**Professor Hans Johnson**

Department of Electrical and Computer Engineering  
University of Iowa

**Professor Michael Schnieders**

Department of Biomedical Engineering  
University of Iowa

# Welcome and Introductions

- Students from a wide range of departments:
  - Biomedical Engineering
  - Chemistry
  - Civil and Environmental Engineering
  - Mechanical and Industrial Engineering
  - Physics and Astronomy
  - Statistics and Actuarial Science
- Please Introduce yourselves:
  - Name
  - Department and University
  - Academic Status and Year (ex. graduate student, 3rd year)
  - High Performance Computing Experience
  - Research Topic

# Aims of this Summer School

To enable you to apply parallel computing to your own research

## General Comments:

- Much of this material may be familiar to you
- We plan to explain things from a very basic level to make sure this group from such diverse backgrounds can follow

# Comments

A few comments before we get started are in order:

- 1) Terminology: Terminology in this field is *not* standardized.
  - This field is new and evolves rapidly.
- 2) HPC is valuable to a wide range of fields:
  - Many examples I use will come from the field of physics.
  - I will try to present the specific problems in a relatively abstract way so that you can consider them simply mathematical problems to be solved.
- 3) Software (programming) vs. Hardware (computers):
  - I am not going to talk a lot about different hardware options, but will focus on the software side, specifically how to design and implement parallel algorithms.

# Comments

## 4) Common approaches vs. Exhaustive coverage:

- This will not be an exhaustive review of all possible HPC approaches
- I will focus on the most important and widely used approaches
- In particular, we will talk a lot about MPI, OpenMP, and CUDA

## 5) Specificity vs. Generality:

- I will try to strike a balance between specific examples, which are often most illuminating, vs. general considerations which may apply to a more wide variety of HPC applications



# Getting Online

Each participant has accounts set up on Neon cluster:

University of Iowa, Research Services:

- Neon

- 258 compute nodes (4216 cores)

- 38 Xeon Phi 5110P Accelerator Cards

- 11 Nvidia Kepler K20 Accelerator Cards

- [neon.hpc.uiowa.edu](http://neon.hpc.uiowa.edu)

- Detailed information for running on Neon is available at

- <https://wiki.uiowa.edu/display/hpcdocs/Neon+Cluster+Documentation>

- See handout for information on getting online and submitting batch jobs

# IHPC 2015 Course Website

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The website with all of the IHPC 2015 Materials can be found at

<http://newton.physics.uiowa.edu/~ghowes/teach/ihpc15/index.html>