

Course Code: GPGN 536 – Advanced Geophysical Computing
Semester Year: Fall Semesters

Instructor: Jeff Shragge, Ge Jin

Pre-requisites: Python programming, C programming

Required Technology: Canvas

Profile in Canvas:

As part of the learning experience at the Colorado School of Mines, our class will be utilizing online learning resources and experiences through the Canvas learning management system. In order to help build community in this online learning environment, you are encouraged to upload your profile picture to Canvas. Photos should be similar to the photos taken for passports or state identification cards.

Course Description:

This course develops the principles of geophysical computing in the context of simulating and validating numerical solutions to the types of partial differential equations commonly found in geophysical investigations (e.g., potential fields, heat flow/diffusion, seismic wave propagation). Students are introduced to architecture of modern computing systems and learn how algorithms can be developed to leverage this architecture to efficiently generate numerical solutions to multidimensional geophysical problems using efficient computing methods.

Learning Outcomes:

This graduate-level course builds on analytical geophysical and numerical/computational skills learned in previous years by applying them in the context of common geophysical computing challenges. Major objectives of the course include:

1. Students will understand and be able to apply concepts of computing in the context of solving complex geophysical problem, many involving field data.
2. Students will develop practical programming skills and combine with knowledge of numerical algorithms to solve real-world geophysical problems.
3. Students will develop independent research skills by undertaking a project involving a substantial piece of analytic, numerical and computation work involving solving a real-world geophysical problem.

4. Students will independently design, develop, validate and apply computer programs to solve geophysical data analysis and numerical modeling tasks, largely using C program with Python-based visualization.

Assessments:

The course will be assessed according to the following:

- Labs (60%)
- Final Project (40%)