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GEO 595.01: Topics in Numerical Methods for Geosciences

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GEO595: Topics in numerical methods for geosciences

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The purpose of this course is to introduce students to a range of advanced and new methods for geosciences research. Each method will be developed to provide students with sufficient familiarity to evaluate applications of the method, read literature critically, and find additional supplementary materials for further study. Emphasis will be on conceptual understanding and experimental design rather than detailed implementation.

Each topic will be covered with the same structure. In the first week, class will include basic content introducing the method and discussion of one or more publications employing it. In the second week, one or more students will present on the topic's potential application to their own research, and then the group will work as a research team to design a detailed implementation.

Grades will be based on three components: 33% general participation in class discussions, 33% on discussion presentation and leadership, and 33% on a final paper building on the moderated discussion of application of one method to the student's own research.

The topics and order listed below may be changed by the consensus of the class.

September 2: final topic selection, course expectations, discussion of class structure

September 9 and 16: Frequentist and spatial statistics

September 23 and 30: Bayesian statistics

October 7 and 14: Signal processing

October 21 and 28: ODE and PDE solvers

November 4 and 11: Stability analysis

November 18 and December 2: Big data algorithms

December 9: final presentations