

COMP GEO

Master of Science Track in Computational Geoscience



Stanford | SCHOOL OF EARTH, ENERGY
& ENVIRONMENTAL SCIENCES

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PROGRAM OVERVIEW

CompGeo is a 45-unit master's degree program developed at Stanford through a close partnership between the Institute for Computational and Mathematical Engineering (ICME) and the School of Earth Sciences through its Center for Computational Earth and Environmental Science. Designed to provide students with a solid foundation in computational and mathematical methods and a specialization in the Earth sciences, the program is aimed at both Earth science students who want to develop expertise in computational research, and students interested in computation who want to develop this specific focus area. Graduates of the program will be prepared to work as scientific computing professionals in industry and government, or to continue on to a doctoral program.

The CompGeo curriculum is based on four fundamental areas:

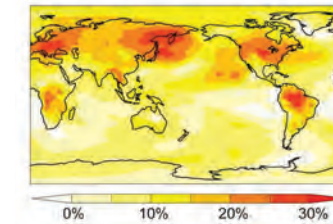
- Modern programming methods
- Applied mathematics with an emphasis on numerical methods
- Algorithms and architectures for high-performance computing
- Computationally-oriented Earth sciences courses

Research focus may be in any one of the School of Earth Sciences' four departments:

- Energy Resources Engineering
- Earth System Science
- Geological Sciences
- Geophysics

Research areas include (but are not limited to):

- Climate modeling
- Computational geomechanics
- Computational geomorphology
- Digital rock physics
- Earthquake modeling
- Geostatistics
- Glaciology
- Multiphase flows
- Petroleum basin and system modeling
- Radar imaging
- Reservoir simulation and optimization
- Seismic imaging
- Tsunami Modeling



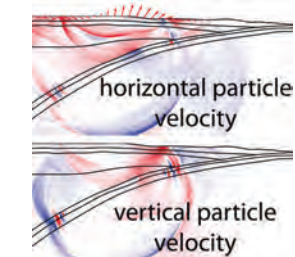
Earth Systems

Research questions address the complex environmental problems caused by human activities in interaction with natural changes in the Earth system.



Resources

Research questions focus on reservoir engineering, seismic and EM imaging, clean energy conversions, carbon capture and storage, energy systems, geothermal engineering, and other renewable energy technologies.



Hazards

Research questions focus on earthquakes and volcanoes, energy, environmental geophysics, and Earth structure and geodynamics.



"The Computational Geoscience Program will educate the research leaders in academia, industry, and government who will make important breakthroughs by exploiting the explosion in geoscience field-data acquisition and the continuous growth of computational power. This partnership between ICME and the Stanford School of Earth Sciences will attract both Earth science students who want to develop expertise in computational research and computationally-oriented students who are looking for a specific focus area."

– Biondo Biondi
Program Director

HOW TO APPLY

Students should apply through ICME and have the option to declare their preference for the CompGeo program during the application process or at any time during the first year of study. For more information visit <https://icme.stanford.edu/admissions>

CONTACT INFORMATION

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About the Institute for Computational & Mathematical Engineering (ICME)

ICME was founded as an institute in 2004, and is the successor program to Scientific Computing and Computational Mathematics (SCCM). ICME works at the intersection of mathematics, computing, and applications in engineering and the applied sciences, collaborating with engineers and scientists to develop improved computational approaches and mathematical models. Work under way at ICME helps to advance many engineering and scientific fields, including fluid and solid mechanics, computer graphics, reservoir modeling, bio-engineering, uncertainty quantification, stochastic optimization, and financial mathematics. More information is available at icme.stanford.edu.

About the Center for Computational Earth and Environmental Sciences (CEES)

CEES integrates Earth science and computer science to build capacity in computational methods for the Earth and environmental sciences, and enables new growth in areas where computational activities exist already. The three pillars of CEES—research, high performance technical computing, and education—work together to fill the gaps between applied computational mathematics and the Earth sciences. Combining a strong focus on scientific applications with state-of-the-art hardware and computational methods, CEES is pushing the frontiers of computational geoscience forward and engaging computer scientists and architects to design software and hardware better suited for Earth and environmental science problems. More information is available at cees.stanford.edu.



"Computational mathematics is the backbone of modern geosciences. So many advances are made thanks to improved mathematical modeling and computer simulation. The ideal future geoscientists will be truly interdisciplinary people who love working at the interface of math, computing, and geosciences. And they will be trained in programs like Computational Geosciences."

– Margot Gerritsen
ICME Director