SEE - Subsurface Energy Engineering

Subsurface Energy Engineering: SEE

Lower-Division Courses

Upper-Division Courses

Graduate Courses

SEE X80. Topics in Subsurface Energy Engineering.

SEE X81K. Subsurface Water Management.

Examine methods for treating, utilizing and disposing of water produced from the subsurface. Discuss the chemistry and engineering principles involved in water treatment and reinjection.

SEE X81L. Nuclear Waste Storage.

Introduction to engineering and science of nuclear waste storage and disposal with emphasis on geological methods. Review current methods and new solutions to safely dispose of radioactive waste resulting from nuclear energy generation.

SEE X81M. Advanced Well Integrity.

Focus on the unique challenges in the construction and integrity of special purpose wells, such as geothermal wells, carbon capture and underground storage (CCUS) wells, and nuclear storage and waste injection wells. Consider the entire lifecycle of these wells, from initial drilling and well construction all the way to their long-term plugging and abandonment. Explore how to maintain well integrity to prevent premature failure of geothermal wells, CO2 leakage in CCUS wells, and nuclear and other waste leakage in waste injection/storage wells for an indefinite period.

SEE X82. Subsurface Energy Storage.

Introduction to hydrogen, compressed air, and carbon storage in geological formations as well as review of ongoing projects and their relations to net-zero greenhouse emission targets. Discuss flow, transport, and geochemical interactions of different gases with site minerals. Gain insights and quantify storage capacity, deliverability, dissolution, trapping, and other loss mechanisms, using hands-on numerical simulation training and exercises.

SEE X82K. Global Carbon Monitoring Systems.

Introduction to the myriad of ways we measure global greenhouse gas emissions, from ubiquitous ground sensors to low-earth orbit satellites. Explore how new technologies are revolutionizing our ability to monitor global energy flows, track progress on emissions reduction goals, and enable new policy approaches to addressing climate change.

SEE X88. Data Analytics and Geostatistics.

Examine fundamental probability and statistics to derive and demonstrate the fundamental deterministic and stochastic spatial modeling paradigms, including kriging, sequential Gaussian simulation, indicator methods, object-based processes, multiple point simulation and generative AI. Discuss uncertainty modeling, model diagnostics and checking, and decision making in the presence of uncertainty.

SEE X88K. Applied Reservoir Simulation for Low-Carbon Energy Projects.

Introduction to geothermal, hydrogen, and carbon capture-storage-utilization (CCUS) projects. Review the key physics, mathematics, and engineering for each process, such as thermal modeling, equation of state for gas projects, and storage and recovery mechanisms for CCUS. Focus on how to build a numerical model with geological description and proper gridding, fluid models based on the fluid types, and energy production mechanisms, followed by uncertainty analysis.

SEE X89. Legal and Technical Issues in Subsurface Trespass.

Examine legal and technical issues related to subsurface trespass on state and federal lands. Discuss how courts define actionable subsurface trespass and explore the implications of fluid injections that cross property boundaries.

SEE X98. Thesis.

SEE X98R. Master's Report.

Prepare a report to fulfill the requirement for the master's degree under the report option.

Professional Courses