GEOS 616
PERMAFROST

Instructor: Vladimir Romanovsky

Week 1	Basic definitions; perennially and seasonally frozen ground; permafrost as a planetary event; horizontal and vertical continuity; geographical distribution; permafrost age; permafrost dynamics during the last glaciation.
Week 2	Surface energy balance and permafrost temperatures; a buffer layer model; heat transfer in the ground.
Week 3	The ground temperature regime; the heat conduction equation; thermal properties of soils; geothermal heat flow and permafrost thickness; seasonal temperature variations.
Week 4	Temperature waves; periodically steady state temperature regime; temperature waves in multi-layered media; application to permafrost studies.
Week 5	Effect of snow and vegetation covers on the active layer and permafrost temperature regime.
Week 6	Thermal offset in the active layer; methods to calculate the thermal offset.
Week 7	Ground freezing and thawing, the Stephan problem; approximate solutions to the Stephan problem.
Week 8	Numerical solutions to the Stephan problem; unfrozen water in the frozen active layer and permafrost.
Week 9	Laboratory and field data on unfrozen water dynamics; numerical models that incorporate the unfrozen water dynamics; role of unfrozen water in the active layer and permafrost.
Week 10	Field and laboratory methods for soil temperature and moisture measurements; permafrost temperature monitoring; geophysical methods in permafrost investigations.
Week 11	Ice in the ground; periglacial forms of the ground surface.
Week 12	Global change and permafrost dynamics.

Week 13	Present knowledge of subsea permafrost distribution and evolution; gas hydrates and permafrost dynamics.
Week 14	Hydrology and hydrogeology of frozen ground; permafrost engineering.
Week 15	Final Exam

Grading Policy:	Exam	40%
	Course Project	30%
	Homework	20%
	Presentations	10%