

Stockholms universitet Coordinator: Volker Brichert
 Teachers: Volker Brichert, Madeleine Bohlin, Wei-Li Hong
 The books are available as electronic resources in the SL library:
 Course book: Peter Ryan Environmental and low-temperature geochemistry (environmental focus, not sufficient for all aspects of the course, but very good for the low-T; ISBN 9781118867358)
 Some of the literature used for course preparation:
 Francis & Taylor (2009): Geochemistry, 2nd edition. Paperback, Cambridge University Press, UK, 2003 (ISBN 9780521891466) Good overview, quantitative approach, restricted content;
 G. Nelson Eby (2004): Principles of Environmental Geochemistry. Thomson Brooks Cole. Good didactic exercises and case examples. Environmental focus, but good background;
 Harry Mc Sween, S. M. Richardson, and M.E. Uhle: Geochemistry (2003): Pathways and processes. 2nd edition; comprehensive, but written by a high-temperature geochemist
 William F. White (2013): Geochemistry. Wiley Blackwell. Advanced, very extensive, 633 p., written by a high-T geochemist
 The Virtual Chemistry Textbook: www.chem1.com/acad/webtext/virtualtextbook.html by Stephen Lower: accessible and well described basic chemistry

Posted readings/assignments on Athena
 Lectures/exercises and exercise results are posted

GEOCHEMISTRY, 15 hp FALL TERM 2025

Weeks	Datum	F.r.a.m.	T.o.m.	Moment	U.ty.p.	L.i.r.a.r.e.	Lokal	Grupp	Antal	Recommended reading before class
40	Thu 2/10	10:00	12:00	Learning goals - introduction to geochemistry	F	Volker Brichert	Y 11			
	Fri 3/10	10:00	12:00	The cosmogenic origin of elements	F	Volker Brichert	Y 11			
	Mon 6/10	10:00	12:00	Chemical composition of Earth and Planets	F	Volker Brichert	Y 11			Chapter 1.1-1.2, Environmental and low-temperature geochemistry
41	Tue 7/10	10:00	12:00	Chemical composition of Earth and Planets: Condensation	F	Volker Brichert	Y 11			Chapter 10 William White Geochemistry: The big picture Cosmochemistry
	Tue 7/10	13:15	16:00	Exercises	ÖVN	Volker Brichert	Y 11			
	Wed 8/10	10:00	12:00	Geochemical differentiation of Earth: Volatile-Refractory behavior	F	Volker Brichert	Y 11			
	Wed 8/10	13:15	16:00	Self study	ÖVN	Volker Brichert	U 10			
	Thu 9/10	10:00	12:00	Geochemical classifications: Goldschmidt	F	Volker Brichert	U 10			
	Thu 9/10	13:15	16:00	Exercises	ÖVN	Volker Brichert	U 10			
	Fri 10/10	13:00	15:00	Review and test	D	Volker Brichert	U 10			
	Mon 13/10	10:00	11:30	The periodic table, wave particles, atomic orbitals	F	Wei-Li Hong	U 10			Chapter 1.3-1.6, 4.4, 4.5 Environmental and low-temperature geochemistry
42	Tue 14/10	10:00	12:00	States of matter: gases and ideal gas law	F	Wei-Li Hong	U 10			
	Tue 14/10	13:15	16:00	Exercises	ÖVN	Wei-Li Hong	U 10			
	Wed 15/10	10:00	12:00	Ionic crystals: The silicates	F	Wei-Li Hong	U 10			
	Wed 15/10	13:00	16:00	Self study	F	Wei-Li Hong	U 10			Chapter 2.1-2.4, Environmental and low-temperature geochemistry
	Thu 16/10	10:00	12:00	Ions and complexes: solubility and mobility	F	Wei-Li Hong	U 10			
	Thu 16/10	13:15	16:00	Exercises	ÖVN	Wei-Li Hong	U 10			
	Fri 17/10	13:00	15:00	Subject recapitulation and test	D	Wei-Li Hong	U 10			
	Mon 20/10	10:00	12:00	Introduction to thermodynamics: State properties; components and phases; closed, open, and isolated systems	F	Madeleine Bohlin	U 28			Chapter 1.10, Environmental and low-temperature geochemistry
	Tue 21/10	10:00	12:00	Introduction to thermodynamics: Heat capacity; Enthalpy, potential energy; and First law	F	Madeleine Bohlin	Y 11			
	Tue 21/10	13:00	16:00	Exercises	ÖVN	Madeleine Bohlin	Y 11			
43	Wed 22/10	10:00	12:00	Introduction to thermodynamics: Entropy and 2nd law	F	Madeleine Bohlin	U 10			
	Wed 22/10	13:00	16:00	Self study	F	Madeleine Bohlin	U 10			
	Thu 23/10	10:00	12:00	Introduction to thermodynamics: The free energy function; activity and non-ideal behavior; and chemical potential; equilibrium constant	F	Madeleine Bohlin	U 10			
	Thu 23/10	13:00	16:00	Exercises	F	Madeleine Bohlin	U 10			
	Fri 24/10	15:00	17:00	Discussion and test	D	Madeleine Bohlin	U 10			
	Mon 27/10	10:00	12:00	Acid-base equilibria: Equilibrium constants and delta C; pH and ionization of water as a function of P and T	F	Madeleine Bohlin	Y 11			Chapter 1.7, and Chapter 5, 9 Environmental and low-temperature geochemistry
	Tue 28/10	10:00	12:00	The carbonate system	F	Madeleine Bohlin	U 10			
	Tue 28/10	13:00	16:00	Exercises	ÖVN	Madeleine Bohlin	U 10			
	Wed 29/10	10:00	12:00	Alkalinity, buffers, freshwater chemistry; Piper diagram	F	Madeleine Bohlin	U 10			
	Wed 29/10	13:15	16:00	Self study	ÖVN	Madeleine Bohlin	U 10			
44	Thu 30/10	10:00	12:00	Alkalinity and ocean carbonate system; chemical composition of seawater	F	Madeleine Bohlin	U 10			
	Thu 30/10	13:00	16:00	Exercises	ÖVN	Madeleine Bohlin	U 10			
	Fri 31/10	13:00	15:00	Subject recapitulation and test	D	Madeleine Bohlin	U 27+			
	Mon 3/11	10:00	12:00	Redox: Half cell, redox potential, redox balance	F	Volker Brichert	U 10			Chapter 1.8-1.9, Chapter 6 Environmental and low-temperature geochemistry
	Tue 4/11	10:00	12:00	Redox: predominance diagrams	F	Volker Brichert	U 10			
	Tue 4/11	13:15	16:00	Exercises	ÖVN	Volker Brichert	U 10			
	Wed 5/11	10:00	12:00	Biogeochemical redox processes	F	Volker Brichert	U 10			
	Wed 5/11	13:15	16:00	Self study	F	Volker Brichert	U 10			
	Thu 6/11	10:00	12:00	Hydrothermal processes	F	Volker Brichert	U 10			
	Thu 6/11	13:15	16:00	Exercises	ÖVN	Volker Brichert	U 10			
45	Fri 7/11	13:00	15:00	Discussion and test	F	Volker Brichert	U 10			
	Mon 10/11	10:00	12:00	Organic Geochemistry: Basic carbon cycle	F	Volker Brichert	U 10			Chapter 3 Environmental and low-temperature geochemistry
	Tue 11/11	10:00	12:00	Organic Chemistry: Molecular orbitals and carbon bonding	F	Volker Brichert	U 10			
	Tue 11/11	13:15	16:00	Exercises	ÖVN	Volker Brichert	U 10			
	Wed 12/11	10:00	12:00	Natural organic molecules and biomarkers	F	Volker Brichert	U 10			
	Wed 12/11	13:00	16:00	Self study	F	Volker Brichert	U 10			
	Thu 13/11	10:00	12:00	Carbon degradation; Diagenesis; fossil fuel and gas formation	F	Volker Brichert	U 10			
	Thu 13/11	13:15	16:00	Exercises	ÖVN	Volker Brichert	U 10			
	Fri 14/11	13:00	15:00	Organic Geochemistry discussion + test	D	Volker Brichert	U 10			
	Mon 17/11	10:00	12:00	Radiogenic isotopes: Radioactive decay, table of nuclides	F	Wei-Li Hong	U 10			Chapter 11 Environmental and low-temperature geochemistry
47	Tue 18/11	10:00	12:00	Radiogenic isotopes: Geochronometry equation: C-14 dating; Rb-Sr and Sm-Nd isochrons	F	Wei-Li Hong	U 10			
	Tue 18/11	13:15	16:00	Exercises	ÖVN	Wei-Li Hong	U 10			
	Wed 19/11	10:00	12:00	Radiogenic isotopes: U-Pb decay chains and secular equilibrium example: Coral reef dating	F	Wei-Li Hong	U 10			
	Wed 19/11	13:00	16:00	Self study	F	Wei-Li Hong	U 10			
	Thu 20/11	10:00	12:00	Radiogenic isotopes: Applications: Sr isotope stratigraphy, crust-mantle differentiation: Pb-210 dating	F	Wei-Li Hong	U 10			
	Thu 20/11	13:15	16:00	Exercises	ÖVN	Wei-Li Hong	U 10			
	Fri 21/11	13:00	15:00	Discussion and test	D	Wei-Li Hong	U 10			
	Mon 24/11	10:00	12:00	Stable isotopes: Nomenclature	F	Madeleine Bohlin	U 10			Chapter 10 Environmental and low-temperature geochemistry
48	Tue 25/11	10:00	12:00	Stable isotopes: Equilibrium and kinetic isotope fractionation; Rayleigh fractionation; open-closed systems	F	Madeleine Bohlin	U 10			
	Tue 25/11	13:00	16:00	Stable isotopes: Isotope mass balance	ÖVN	Madeleine Bohlin	U 10			
	Wed 26/11	10:00	12:00	Stable isotopes: Carbonic acid system; organic C; biomarker isotopes	F	Madeleine Bohlin	U 10			
	Wed 26/11	13:00	16:00	Self study	F	Madeleine Bohlin	U 10			
	Thu 27/11	10:00	12:00	Stable isotopes: N, S, metals	F	Madeleine Bohlin	U 10			
	Thu 27/11	13:00	16:00	Stable isotopes	ÖVN	Madeleine Bohlin	U 10			
	Fri 28/11	13:00	15:00	Discussion and test	D	Madeleine Bohlin	U 10			
	Mon 1/12	09:00	13:00	Exam	Exam		Y 11			