Code: **QG104**

Name: **Química**

Name in English: **Chemistry**

Name in Spanish: **Química**

Subject type: **Weekly**

Approval Type: **Grade e Frequency**

Characteristic: **Regular**

Frequency: **75%**

Period Type / Offering period: **Semestral / 1st Period – odd periods**

Requires Final Exam: **Yes**

Vectors

T	L	P	O	PE	OE	SL	WEEKS	CREDITS
4	**-**	**-**	**-**	**-**	**-**	**4**	**15**	**4**

Occurrence on curriculum: **53**

Pre requirement:

Summary: The atom: shape and energy of orbitals and electron distributions. The periodic table and its associated properties. Chemical bond and its properties, properties of simple minerals. Aqueous solutions: ways of expressing concentration, pH, equilibrium constant. Basics of physical chemistry: energy, equilibrium and kinetics of geological processes. Organic chemistry functional groups and relevant applications in the Earth system.

Program:

01. Presentation of the discipline objectives - Chemistry and the Revolutions in Society.
02. Development of the atomic model – Brief historic about the origin of the atomic models – What is a chemical element? - Isotopes, isotones, isobars – Average atomic masses from natural abundance of isotopes – The concept of mol, comparison with the macroscopic world.
03. a) Isotopes: geological dating (C-14 and O-18 isotopes in geology) b) Nuclear reactions and the origins of chemical elements.
04. Electronic structure of the atom.
05. Electron distributions in multielectronic atoms and the origins of the periodic table.
06. Periodicity: ionization energy and atomic radius.
07. Chemical bond
08. a) Ratio of atomic radii and its importance in mineralogy and geochemistry. b) Element distribution in biosphere, presence of elements in minerals and Brazilian minerals.
09. Crystals with oxyanions, zeolites and other silicates.
10. Chemical bond II
11. Chemical bond III
12. Comparison of ionic, molecular and metal properties.
13. a) Concentration in mass percentage, ppm, ppb, ppt and mol/L. b) Transformation of matter: chemical reactions. c) Introduction to the acid and base concept (Broensted e Lewis).
14. Neutralization reactions.
15. Solubility of ionic compounds and precipitation reactions. Concept of saturation and solubility product.
16. Obtaining metals and redox reactions.

17. Groups I, II and III chemistry.
18. Groups V, VI and VII chemistry.
19. Thermodynamics.
20. Basics of chemical equilibrium. Lê Chatelier principle.
21. Solid-liquid equilibrium. Phase diagrams and the phase rule applied to solid-liquid systems.
22. Carbon chemistry.
23. Basics of petroleum chemistry.
24. Energy sources and energy transformations. Combustion of fossil fuels and alternative sources of energy.
25. The Brazilian chemistry industry in numbers.
26. Perspectives for the world chemistry industry. Environmental pressure. Globalization of chemical input production.

Basic Bibliography

1) ATKINS, P.; JONES, L.; **"Princípios de Química - Questionando a Vida Moderna e o Meio Ambiente"**, Bookman, Porto Alegre, 2001.
2) GILLESPIE, R. J.; EATON, D. R.; HUMPHREYS, D. A.; ROBINSON, E. A., **"Atoms, Molecules and Reactions - An Introduction to Chemistry"**, Prentice Hall, New Jersey, 1994.
3) CHANG, R., **"Chemistry"**, McGraw-Hill, London, 1994.
4) MANAHAN, S. E., **"Fundamentals of Environmental Chemistry"**, Lewis Publishers, London, 1993.
5) BROWNLOW, A. H., **"Geochemistry"**, Prentice Hall, New Jersey, 1996.
6) TEIXEIRA, W.; TOLEDO, M. C. M.; FAIRCHILD, T. R.; TAIOLI, F., **"Decifrando a Terra"**, Oficina de Textos, São Paulo, 2000.