CENTRO UNIVERSITÁRIO
DEPARTAMENTO: **QUÍMICA**

QUI 2694 Tópicos Especiais de Físico-Química (Physical Chemistry of Polymers and Surfactants applied to Cosmetics)

Tipo de Disciplina: Eletiva

Carga Horária Total: 30 horas Créditos: 2

Pré-requisito: Co-requisite = Projects in Chemistry of Cosmetics for Science Communication

OBJETIVOS

This course provides a foundation in concepts and phenomena related to the physical chemistry of polymers and surfactants in solutions, illustrated through examples of applications in the area of cosmetics. It is intended for students simultaneously coursing “Projects in Chemistry of Cosmetics for Science Communication”.

EMENTA

Surfactants and polymers are used together in a wide range of applications, but the chemistry of cosmetics will be the subject of this course to attract student’s attention. In solution, surfactant and polymers provide physicochemical properties necessary to the desired application. The behavior of each component is important, but the final performance of the formulation depends on the interplay between both of them. Hence, students will learn about the two components in solution and their interactions, which are important to understand, develop and characterize cosmetics in a scientific way. For that, the main contents of the course are: introduction to surfactants, micellization, lyotropic liquid crystals, introduction to polymers, polymers in solution, surfactant-polymer systems, applications in cosmetics. During the course, all the contents will be explained, discussed and illustrated with examples of cosmetic’s formulations and their properties.

The course can be offered either in English or in Portuguese according to the audience.

PROGRAMA

Introduction to surfactants

Surfactants classification and intermolecular interactions

Surface tension, micelles, cleansing

Surfactant classes to different cosmetics

Micellization and phase behavior in aqueous solutions

Foaming

Emulsions, HLB and PIT method

Lyotropic liquid crystals

Physicochemical properties for cosmetic formulations

Introduction to polymers

Chain architecture

Molecular weight distribution

Polymers in solution - Concentration regimes

Thermodynamics of dilute polymer solution

Flory-Huggins Theory

Theta solutions

Viscosity and introduction to rheology

Polymers to control formulations properties

Surfactant-Polymer interactions

Surfactant-Polymer phase behavior

Surfactants and polymers in formulations

AVALIAÇÃO

Written examinations

BIBLIOGRAFIA PRINCIPAL

- Holmber, K.; Jönsson, B.; Kronberg, B.; Lindman, B.; Surfactants and Polymers in Aqueous Solutions, West Sussex, John Wiley & Sons, Ltd. 2nd edtion, 2002.
- Tadros, T.F.; Colloids in Cosmetics and Personal Care (Volume 4 in Colloids and Interface Science Series), Weinheim, Willey-VCH Verlag GmbH & Co., 2007
- Williams, D.F.; Schmitt, W.H.; Chemistry and Technology of the Cosmetics and Toiletries Industry, London, Blackie Academic & Professional, 2nd edtion, 1996.

BIBLIOGRAFIA COMPLEMENTAR

- Teraoka, I.; Polymer Solutions – An Introduction to Physical Properties, New York, John Wiley & Sons, Inc., 2002.
- Tadros, T.F.; Applied Surfactants – Principles and Applications, Weinheim, Willey-VCH Verlag GmbH & Co., 2005
- Sakamoto, K.; Lochhead, R.Y.; Maibach, H.I.; Yamashita, Y.; Cosmetic Science and Technology: Theoretical Principles and Applicatoins, Amsterdam, Elsevier, 2017.
- Myers, D.; Surfactant science and technology, New Jersey, John Wiley & Sons, Inc., 2006