

212028 – EXPERIMENTS PLANNING AND OPTIMIZATION

CREDITS: 04 (four) – 60 hours/class

CONTENT:

Present concepts and fundamentals of basic parametric statistics. Bring forward concepts, classification, fundamentals and applications of planning and optimization from experiments, as well as their potentialities for the monitoring or development of processes in science and technology.

SYLLABUS:

1. Sample classification and identification of the sample.
2. Distribution: Normal, standard normal, Student t and Snedecor F.
3. Descriptive statistics, statistical inference and hypothesis tests.
4. Assessment of assumptions: normality, independence, homoscedasticity and lack of adjustment.
5. Comparison between a set of samples and a reference sample.
6. Comparison between two samples: paired t-test, unpaired t-test (grouped and non-grouped variance), F-test and Grubbs test.
7. Simultaneous comparison between three or more samples: Anova single factor (Anova one-way)
8. Adjustment of linear models (Ordinary least squares method and weighted least squares method): external calibration curve, calibration curve with standard addition, calibration curve with internal standard addition, calibration curve with matrix superposition.
9. Full factorial planning of type 2^k
10. Mixed factorial planning
11. Fractional factorial planning of type 2^{k-1}
12. Factorial Planning for Response Surface Modeling
13. Factorial schedules with central points
14. Analysis of adjustment lack for a linear model in the parameters.
15. Practical class and training in spreadsheet involving planning, organization, treatment and processing of data through the EXCEL platform.
16. Examples of applications in chemistry and related fields.

BIBLIOGRAPHY:

1. BARROS Neto, Benicio; SCARMINIO, Ieda Spacino; BRUNS, Roy Edward. Como fazer experimentos: pesquisa e desenvolvimento na ciência e na indústria. 4.ed. Bookman, 2010.
2. RODRIGUES, M. I.; IEMMA, A. F. Planejamento de Experimentos e Otimização de Processos: uma estratégia sequencial de planejamentos. Casa do Pão Editora, 2005.
3. MONTGOMERY, Douglas C.; RUNGER, George C. Estatística Aplicada e Probabilidade para Engenheiros. 5.ed. LTC, 2012.
4. TEÓFILO, Reinaldo F.; FERREIRA, Márcia M. C. Quimiometria II: planilhas eletrônicas para cálculos de planejamentos experimentais, um tutorial. QUÍMICA NOVA, Vol. 29, N. 2, 338-350, 2006.