Statistics

1. **Course number and name:** 020STACS2 Statistics

2. **Credits, contact hours:** 4 ECTS credits, 2x1:15 contact hours

3. **Name of instructor:** Wadih Skaff

4. **Instructional Materials:**
   - Course handouts (ppt and pdf documents provided by the instructor)

5. **Specific course information**
   a. **Catalog description:**
   This course is a standard applied statistics course that applies to chemical and petrochemical discipline. It introduces the necessary statistical analysis that will be needed in a chemical and petrochemical engineer career. Topics to be covered include descriptive statistics, parametric tests (independent samples t-test, paired-samples t-test, one sample t-test, ANOVA), non-parametric tests (Mann-Whitney test, Wilcoxon matched pairs test, Wilcoxon test, Kruskal-Wallis test), Chi-squared test, linear correlation and regression and ANOVA repeated measures. The course will focus on the verification of assumptions required by each statistical used test (normality, equality of variances, …). It will use the flipped classroom approach to expose students to a basic statistical method and their use in the real world. The course utilizes the IBM-SPSS software package for selected problems.

   b. **Prerequisites:** 020PRBNI4 Probability

   c. **Required/ Selected Elective/Open Elective:** Required

6. **Educational objectives for the course**
   a. **Specific outcomes of instruction:**
   - Interpret different types of statistical indicators and graphics computed during a statistical analysis (OI1)
   - Recognize the characteristics of a normal distribution (OI2)
   - Recognize the characteristics used to create a sample (OI3)
   - Identify the adequate statistical test (analysis) to use in a chemical and petrochemical research (OI4)
   - Produce a descriptive analysis to a data collected (OI5)
   - Run a selected statistical test under a statistical software (SPSS) (OI6)
   - Use the adequate results obtained from a statistical software output and formulate them in an adequate language (OI7)

   b. **PIs addressed by the course:**

PI	6.3
Covered	x
Assessed	x

7. Brief list of topics to be covered

- Introducing the syllabus to students, Introduction to statistics
- Descriptive statistics: central tendency indicators
- Descriptive statistics: dispersion indicators
- Descriptive statistics: skewness and kurtosis indicators
- Descriptive statistics: graphical presentations
- Descriptive statistics study: questionnaire rules, creation of a form, cleaning and coding a data base downloaded from a form, exporting data to SPSS, running a descriptive analysis using SPSS, reporting results
- Normal distribution
- Sampling theory
- Introduction to inferential statistics/hypothesis tests
- Hypothesis tests: Chi-square test calculation
- Hypothesis tests: Chi-square test under SPSS
- Hypothesis tests: one sample t-test calculation and one sample t-test under SPSS
- Hypothesis tests: paired samples t-test calculation and paired samples t-test under SPSS
- Hypothesis tests: independent samples t-test calculation and independent samples t-test under SPSS
- Hypothesis tests: ANOVA calculation and ANOVA under SPSS
- Linear correlation/linear regression calculation and Linear correlation/linear regression under SPSS
- Non parametric tests under SPSS
- ANOVA repeated measures under SPSS

.