PROCESSING THE MEASUREMENT RESULTS

Pharmacy - Integrated academic studies

SECOND YEAR- Semester IV

2025/26 School Year

Name of the course:

PROCESSING THE MEASUREMENT RESULTS

ECTS credits - 5; No. of hours active teaching per week: 4 (Lectures-2, Practice-1, Seminar-1)

Teachers and instructors:

	Name and surname	E-mail address	Academic rank
1.	Nebojša Zdravković	nzdravkovic@fmn.kg.ac.rs	Full Professor
2.	Miroslav Sovrlić	sofke-ph@hotmail.com	Associate professor
3.	Milan Zarić	zaricmilan@gmail.com	Associate professor
4.	Miloš Milosavljević	milosavljevicmilos91@gmail.com	Assistant professor
5.	Ana Pejčić	anapejcic201502@yahoo.com	Assistant professor
6.	Jovica Tomović	jovicatomovic2011@gmail.com	Assistant professor
7.	Sara Mijailović	saramijailovic212@gmail.com	Teaching assistant

Course structure:

Course contents	**Weeks**	**Lectures**	**Practice**	**Seminar**	**Course Coordinator**
Fundamental pharmaceutical calculations, measurement systems and error analysis. Statistical methods, probability distributions, and graphical data representation. Parametric and nonparametric tests, correlation, regression, and spectroscopic/chromatographic techniques. Biochemical measurements, chemometric data analysis, multivariate analysis, and experimental design. Pharmaceutical data visualization and hands-on experience with UV-Vis spectroscopy and HPLC. Calculating pharmacokinetic parameters, pharmacodynamics, determining effective, toxic, lethal doses and therapeutic index.	15	2	1	1	Asst. Prof. Miroslav Sovrlić

Students' knowledge assessment:

Students' knowledge assessment goes on during the whole semester and it includes points gained for attending lectures, completing practice work, term paper and progress tests as well as for the final written exam. The points can be gained according to the following model:

	Points
Pre-exam requirements	**60 points**
Taking progress tests	30 points
Writing a term paper	15 points
Doing practice work	15 points
Exam requirements	**40 points**
Written examination	40 points

In order to pass the exam, the student must achieve more than 50 percent of the points in all forms of teaching.

Grades:

The student gains a final grade which describes the quality of his knowledge and the results achieved in the course. The interrelation between points and final grades are given in the following table:

Num. achieved points	**Num. grade**	**Definition**
0 – 50	5	UNSATISFACTORY
51 – 60	6	PASS
61 – 70	7	SATISFACTORY
71 – 80	8	GOOD
81 – 90	9	VERY GOOD
91 – 100	10	EXCELLENT

LITERATURE:

Textbook	Authors	Publisher	Availability in the library
Pharmaceutical calculations 15th Edition.	Howard C. Ansel	Lippincott Williams & Wilkins, 2012	YES
Handbook of modern pharmaceutical analysis (Vol. 10). Academic press; 2010.	Satinder Ahuja, Stephen Scypinski	Academic press, 2010	YES
Common errors in statistics (*and how to avoid them*).	Phillip I. Good, Hardin W. James	John Wiley & Sons, 2012.	YES
Discovering statistics using SPSS	Field A.	London: Sage, 2009.	YES
Handbook of pharmacology and toxicology	Slobodan M. Janković	Faculty of Medical Sciences, Kragujevac, 2021	YES

All lectures (powerpoint presentations) are available on the website of the Faculty of Medical science: www.medf.kg.ac.rs

PROGRAM

UNIT I (FIRST WEEK):

Lectures (2 classes)	**Practice (1 classes)**	**Seminar (1 class)**
Fundamentals of pharmaceutical calculations	Practice problems in pharmaceutical calculations	The importance of accuracy in pharmaceutical calculations: Real-world implications

UNIT II (SECOND WEEK):

Lectures (2 classes)	**Practice (1 classes)**	**Seminar (1 class)**
Pharmaceutical measurement. International system of units.	Practical applications of SI units in pharmaceutical measurements	Evolution and standardization of pharmaceutical measurement systems

UNIT III (THIRD WEEK):

Lectures (2 classes)	**Practice (1 classes)**	**Seminar (1 class)**
Fundamental expressions of concentration and physical properties of substances	Determination of density, specific gravity and concentration of pharmaceutical solutions	Interpretation of concentration expressions in pharmaceutical practice

UNIT IV (FOURTH WEEK):

Lectures (2 classes)	**Practice (1 classes)**	**Seminar (1 class)**
Measurement errors and uncertainty calculation	Estimation of errors in pharmaceutical measurements	Types of measurement errors and their impact on data interpretation

UNIT V (FIFTH WEEK):

Lectures (2 classes)	**Practice (1 classes)**	**Seminar (1 class)**
Basic statistical methods and measures of dispersion	Calculating mean, median, mode, range, standard deviation, variance, coefficient of variation	Interpretation of dispersion measures in different datasets

UNIT VI (SIXTH WEEK):

Lectures (2 classes)	**Practice (1 classes)**	**Seminar (1 class)**
Probability distributions (normal, poisson, and binomial distributions)	Using software for probability distributions and checking normality of a dataset	Interpretation of graphs for checking normal distribution (histograms, Q-Q plots, box plots)

UNIT VII (SEVENTH WEEK):

Lectures (2 classes)	**Practice (1 classes)**	**Seminar (1 class)**
Graphical data representation	Using software to create different types of graphs	Interpretation of different types of graphs

UNIT VIII (EIGHT WEEK):

Lectures (2 classes)	**Practice (1 classes)**	**Seminar (1 class)**
Parametric and nonparametric tests (Independent and paired t-test, ANOVA, Mann-Whitney U, Wilcoxon Signed-Rank, Kruskal-Wallis, Test selection)	Using software to perform parametric and nonparametric tests	Interpretation of test results in real datasets

UNIT IX (NINTH WEEK):

Lectures (2 classes)	**Practice (1 classes)**	**Seminar (1 class)**
Correlation and regression (Pearson, Spearman, Regression line, Least squares method)	Using software to perform correlation and regression analysis	Interpretation of correlation coefficients and regression results

UNIT X (TENTH WEEK):

Lectures (2 classes)	**Practice (1 classes)**	**Seminar (1 class)**
Spectroscopic and chromatographic methods and measurements in pharmacy and data analysis	UV-Vis spectroscopy and HPLC: Hands-on data collection and analysis	Application of spectroscopy and chromatography in phytochemistry

UNIT XI (ELEVENTH WEEK):

Lectures (2 classes)	**Practice (1 classes)**	**Seminar (1 class)**
Biochemical measurements	Spectrophotometric determination of biomolecules	Analytical techniques in biochemical measurements

UNIT XII (TWELFTH WEEK):

Lectures (2 classes)	**Practice (1 classes)**	**Seminar (1 class)**
Fundamentals of chemometric data analysis	Data visualization in pharmaceutical analysis	Pharmaceutical research: From data to decision

UNIT XIII (THIRTEENTH WEEK):

Lectures (2 classes)	**Practice (1 classes)**	**Seminar (1 class)**
Multivariate data analysis and experimental design in pharmaceutical analysis	Experimental design and data analysis using MVA techniques	Application of Principal Component Analysis (PCA) in pharmacy

UNIT XIV (FOURTEENTH WEEK):

Lectures (2 classes)	**Practice (1 classes)**	**Seminar (1 class)**
Calculations of the basic parameters that determine drug absorption: area under the curve (AUC) and bioavailability	Volume of distribution: calculation and practical implication	Calculation of parameters that determine drug elimination: drug clearance, elimination half-time and the elimination rate constant

UNIT XV (FIFTEENTH WEEK):

Lectures (2 classes)	**Practice (1 classes)**	**Seminar (1 class)**
Pharmacodynamics and quantitative relationships underlying the actions of drugs	Calculation and estimation of effective doses, toxic doses and lethal doses	Calculation of therapeutic index

LECTURES AND PRACTICE

FRIDAY

BLUE HALL (H44)

08.00-11.55

Schedule of lectures, practical classes and tests – academic calendar

LESSON SCHEDULE FOR THE COURSE PROCESSING THE MEASUREMENT RESULTS

week	date	time	Location	form	course unit title	teacher
1				L	Fundamentals of pharmaceutical calculations	Assoc. Prof. Miroslav Sovrlić
				P	Practice problems in pharmaceutical calculations	
				S	The importance of accuracy in pharmaceutical calculations: Real-world implications	
2				L	Pharmaceutical measurement. International system of units.	Assoc. Prof. Miroslav Sovrlić
				P	Practical applications of SI units in pharmaceutical measurements	
				S	Evolution and standardization of pharmaceutical measurement systems	
3				L	Fundamental expressions of concentration and physical properties of substances	Asst. Prof. Jovica Tomović
				P	Determination of density, specific gravity and concentration of pharmaceutical solutions	
				S	Interpretation of concentration expressions in pharmaceutical practice	
4				L	Measurement errors and uncertainty calculation	

LESSON SCHEDULE FOR THE COURSE PROCESSING THE MEASUREMENT RESULTS

week	date	time	Location	form	course unit title	teacher
				P	Estimation of errors in pharmaceutical measurements	Assoc. Prof. Milan Zarić
				S	Types of measurement errors and their impact on data interpretation	
5				**L**	Basic statistical methods and measures of dispersion	Prof. Nebojša Zdravković
				P	Calculating mean, median, mode, range, standard deviation, variance, coefficient of variation	Asst. Sara Mijailović
				S	Interpretation of dispersion measures in different datasets	
6				**L**	Probability distributions (normal, poisson, and binomial distributions)	Prof. Nebojša Zdravković
				P	Using software for probability distributions and checking normality of a dataset	Asst. Sara Mijailović
				S	Interpretation of graphs for checking normal distribution (histograms, Q-Q plots, box plots)	
7				**L**	Graphical data representation	Prof. Nebojša Zdravković
				P	Using software to create different types of graphs	Asst. Sara Mijailović
				S	Interpretation of different types of graphs	

LESSON SCHEDULE FOR THE COURSE PROCESSING THE MEASUREMENT RESULTS

week	date	time	Location	form	course unit title	teacher
				T	**PROGRESS TEST 1**	
8				**L**	Parametric and nonparametric tests (Independent and paired t-test, ANOVA, Mann-Whitney U, Wilcoxon Signed-Rank, Kruskal-Wallis, Test selection)	Prof. Nebojša Zdravković
				P	Using software to perform parametric and nonparametric tests	Asst. Sara Mijailović
				S	Interpretation of test results in real datasets	
9				**L**	Correlation and regression (Pearson, Spearman, Regression line, Least squares method)	Prof. Nebojša Zdravković
				P	Using software to perform correlation and regression analysis	Asst. Sara Mijailović
				S	Interpretation of correlation coefficients and regression results	
10				**L**	Spectroscopic and chromatographic methods and measurements in pharmacy and data analysis	Asst. Prof. Jovica Tomović
				P	UV-Vis spectroscopy and HPLC: Hands-on data collection and analysis	
				S	Application of spectroscopy and chromatography in phytochemistry	
11				**L**	Biochemical measurements	Assoc. Prof. Milan Zarić

LESSON SCHEDULE FOR THE COURSE PROCESSING THE MEASUREMENT RESULTS

week	date	time	Location	form	course unit title	teacher
				P	Spectrophotometric determination of biomolecules	
				S	Analytical techniques in biochemical measurements	
12				**L**	Fundamentals of chemometric data analysis	Assoc. Prof. Miroslav Sovrlić
				P	Data visualization in pharmaceutical analysis	
				S	Pharmaceutical research: From data to decision	
13				**L**	Multivariate data analysis and experimental design in pharmaceutical analysis	Assoc. Prof. Miroslav Sovrlić
				P	Experimental design and data analysis using MVA techniques	
				S	Application of Principal Component Analysis (PCA) in pharmacy	
14				**L**	Calculations of the basic parameters that determine drug absorption: area under the curve (AUC) and bioavailability	Asst. Prof. Miloš Milosavljević
				P	Volume of distribution: calculation and practical implication	

LESSON SCHEDULE FOR THE COURSE PROCESSING THE MEASUREMENT RESULTS

week	date	time	Location	form	course unit title	teacher
				S	Calculation of parameters that determine drug elimination: drug clearance, elimination half-time and the elimination rate constant	
15				**L**	Pharmacodynamics and quantitative relationships underlying the actions of drugs	Asst. Prof. Ana Pejčić
				P	Calculation and estimation of effective doses, toxic doses and lethal doses	
				S	Calculation of therapeutic index	
				T	**PROGRESS TEST 2**	
				E	**EXAM (June deadline)**	