Philadelphia University	PHILADELPHIA UNIVERSITY THE WAY TO THE FUTURE	**Approval date:**
Faculty of Science		**Issue:**
Department of Math		**Credit hours: 3**
Academic year 2021/2022	**Course Syllabus**	**Bachelor**

Course information

Course#	Course title	Prerequisite
0250109	**Mathematics and Biostatistics**	**None**

Course type	Class time	Room #
☐ University Requirement ☒ Faculty Requirement ☐ Major Requirement ☐ Elective ☒ Compulsory	ST 9:45-11:15 MW 8:15-9:45 MW 11:15-12:45	21009 6717 21009

Instructor Information

Name	Office No.	Phone No.	Office Hours	E-mail
Feras Awad	822	2132	ST 11:15–12:30 MW 09:45–11:00	fawad@philadelphia.edu.jo

Course Delivery Method

Course Delivery Method			
☒ **Physical**	☐ **Online**	☐ **Blended**	
Learning Model			
Precentage	**Synchronous**	**Asynchronous**	**Physical**
	0%	**0%**	**100%**

Course Description

Preliminaries: Numbers, Algebraic Manipulations. **Measurements and Calculations:** Scientific Notation, Units Conversion (Length, Volume, Mass, Temperature). **Functions and Sequences:** Essential Functions, Exponential Functions, Logarithms (Semilog and Log-Log Plots). **Descriptive Statistics:** Numerical Descriptions of Data (Types of data, Measures of Central Tendency and Spread), Graphical Descriptions of Data, Relationships between Variables (Regression), Populations, Samples, and Inference. **Probability:** Principles of Counting, What Is Probability? (Experiments, Outcomes, Events), Conditional Probability (Multiplication Rule, Independence), Discrete Random Variables, Continuous Random Variables. **Inferential Statistics:** The Sampling Distribution (of Mean and Standard Deviation), Confidence Intervals, Hypothesis Testing (*t*-test, *P*-value).

Course Learning Outcomes

Number	Outcomes	Corresponding Program outcomes *
Knowledge		
K1	Know the basic concepts of functions and the accompanying mathematical techniques and procedures.	**1**
K2	Organize and interpret data graphically and numerically.	**1**
K3	Understand the axioms of probability and use probability rules to evaluate probability of events.	**1**
K4	Perform hypothesis tests and construct confidence intervals on the mean and the variance of a normal distribution.	**1**
Skills		
S1	Use computer software like GeoGebra and Google Sheets to do calculations.	**9**
S2	Ability to solve basic mathematical problems in medical, pharmaceutical, and life sciences.	**2**
Competencies		
C1	Thinking reasonably and the ability to make decisions.	**3**
C2	Work in a team to implement one of the tasks of the course.	**11**

* According to learning outcomes of the faculty of pharmacy.

Learning Resources

Course textbook	Stewart, J. and Day, T. (2016) Biocalculus: Calculus, Probability, and Statistics for the Life Sciences (1st ed.). Cengage Learning.
Supporting References	• Greenwell, R. N., Ritchey, N. P., Lial M. L. (2015) Calculus for the Life Sciences (2nd ed.). Pearson. • Samuels M. L., Witmer J. A., Schaffner A. (2016) Statistics for the Life Sciences (5th ed.). Pearson.
Supporting websites	✓ GeoGebra: https://www.geogebra.org/ ✓ Google Sheets: http://sheets.new/
Teaching Environment	☒**Classroom** ☐ **laboratory** ☐**Learning platform** ☐**Other**

Meetings and Subjects Timetable

Week	Topic	Learning Methods	Tasks	Learning Material
1	Explanation of the study plan for the course, and what is expected to be accomplished by the students. **Preliminaries:** Numbers, Algebraic Manipulations.	Lecture		Course Syllabus Diagnostic Tests
2	**Four Ways to Represent a Function:** Representations of Functions, Piecewise Defined Functions, Symmetry, Periodic Functions, Increasing and Decreasing Functions.	Lecture		Chapter 1

3	**A Catalog of Essential Functions:** Linear Models, Polynomials, Power Functions, Rational Functions, Algebraic Functions, Trigonometric Functions, Exponential Functions, Logarithmic Functions.	Lecture	Computer Task using GeoGebra	Chapter 1
4	**Exponential Functions:** The Growth of Malarial Parasites, Exponential Functions, Exponential Growth, HIV Density and Exponential Decay, The Number *e*.	Lecture		Chapter 1
5	**Logarithms; Semilog and Log-Log Plots:** Inverse Functions, Logarithmic Functions, Natural Logarithms, Graph and Growth of the Natural Logarithm, Semilog Plots, Log-Log Plots.	Lecture	Quiz	Chapter 1
6	**Numerical Descriptions of Data:** Types of Variables, Categorical Data, Numerical Data: Measures of Central Tendency, Numerical Data: Measures of Spread, Numerical Data: The Five-Number Summary, Outliers.	Lecture		Chapter 11
7	**Graphical Descriptions of Data:** Displaying Categorical Data, Displaying Numerical Data: Histograms, Interpreting Area in Histograms, The Normal Curve. **Relationships between Variables:** Two Categorical Variables, Categorical and Numerical Variables,	Lecture	Computer Task using GeoGebra and/or Google Sheets	Chapter 11
8	Two Numerical Variables. **Populations, Samples, and Inference:** Populations and Samples, Properties of Samples, Types of Data, Causation	Lecture		Chapter 11
9	**Principles of Counting:** Permutations, Combinations	Lecture		Chapter 12
10	**What Is Probability?** Experiments, Trials, Outcomes, and Events, Probability When Outcomes Are Equally Likely, Probability in General. **Conditional Probability:** Conditional Probability, The Multiplication Rule and Independence.	Lecture	Homework	Chapter 12
11	**Discrete Random Variables:** Describing Discrete Random Variables, Mean and Variance of Discrete Random Variables, Bernoulli Random Variables, Binomial Random Variables	Lecture	Midterm Exam	Chapter 12
12	**Continuous Random Variables:** Describing Continuous Random Variables, Mean and Variance of Continuous Random Variables, Exponential Random Variables, Normal Random Variables.	Lecture		Chapter 12
13	**The Sampling Distribution:** Sums of Random Variables, The Sampling Distribution of the Mean, The Sampling Distribution of the Standard Deviation.	Lecture	Quiz	Chapter 13

14	**Confidence Intervals:** Interval Estimates, Student's *t*-Distribution	Lecture		Chapter 13
15	**Hypothesis Testing:** The Null and Alternative Hypotheses, The *t*-Statistic, The *P*-Value.	Lecture	Group Case Study	Chapter 13
16	Final Exam			

* Includes: Lecture, flipped Class, project- based learning, problem solving based learning, collaborative learning

Course Contributing to Learner Skill Development

Using Technology
• Use GeoGebra to study the properties of different mathematical functions and perform operations on them. • Use Google Sheets to perform descriptive and inferential statistics.
Communication Skills
• Writing a report that summarizes real-life data numerically and graphically and represents it to the students in class.
Application of Concepts Learnt
• Making a hypothesis test about the population mean of a real-life case and publicize a decision about the case.

Assessment Methods and Grade Distribution

Assessment Methods	Grade Weight	Assessment Time (Week No.)	Link to Course Outcomes
Mid Term Exam	**30%**	**11**	**K1, K2, C1**
Various Assessments *	**30%**	**Continuous**	**S1, S2, C1, C2**
Final Exam	**40%**	**16**	**K1, K2, K3, K4, C1**
Total	**100%**		

* Includes: quiz, in class and out of class assignment, presentations, reports, videotaped assignment, group or individual projects.

Alignment of Course Outcomes with Learning and Assessment Methods

Number	Learning Outcomes	Learning Method*	Assessment Method**
Knowledge			
K1	Know the basic concepts of functions and the accompanying mathematical techniques and procedures.	Lecture	**Exam**
K2	Organize and interpret data graphically and numerically.	Lecture	**Exam**
K3	Understand the axioms of probability and use probability rules to evaluate probability of events.	Lecture	**Exam**
K4	Perform hypothesis tests and construct confidence intervals on the mean and the variance of a normal distribution.	Lecture	**Exam**

Skills			
S1	Use computer software like GeoGebra and Google Sheets to do calculations.	Case study	**Computer project**
S2	Ability to solve basic mathematical problems in medical, pharmaceutical, and life sciences.	Case study	**Individual project**
Competencies			
C1	Thinking reasonably and the ability to make decisions.	Discussion	**Quiz**
C2	Work in a team to implement one of the tasks of the course.	Case study	**Group project**

* Includes: Lecture, flipped Class, project- based learning, problem solving based learning, collaborative learning

** Includes: quiz, in class and out of class assignment, presentations, reports, videotaped assignment, group or individual projects.

Course Polices

Policy	Policy Requirements
Passing Grade	The minimum passing grade for the course is (50%) and the minimum final mark recorded on transcript is (35%).
Missing Exams	• Missing an exam without a valid excuse will result in a zero grade to be assigned to the exam or assessment. • A Student who misses an exam or scheduled assessment, for a legitimate reason, must submit an official written excuse within a week from an exam or assessment due date. • A student who has an excuse for missing a final exam should submit the excuse to the dean within three days of the missed exam date.
Attendance	The student is not allowed to be absent more than (15%) of the total hours prescribed for the course, which equates to six lectures days (M, W) and seven lectures (S, T, T). If the student misses more than (15%) of the total hours prescribed for the course without a satisfactory excuse accepted by the dean of the faculty, s/he will be prohibited from taking the final exam and the grade in that course is considered (zero), but if the absence is due to illness or a compulsive excuse accepted by the dean of the college, then withdrawal grade will be recorded.
Academic Honesty	Philadelphia University pays special attention to the issue of academic integrity, and the penalties stipulated in the university's instructions are applied to those who are proven to have committed an act that violates academic integrity, such as: cheating, plagiarism (academic theft), collusion, and violating intellectual property rights.

Program Learning Outcomes to be Assessed in this Course

Number	Learning Outcome	Course Title	Assessment Method	Target Performance level
2	Apply concepts and techniques related to the pharmacy knowledge from basic sciences, pharmaceutical and medicinal chemistry, pharmacology, medical sciences, clinical pharmacy, and pharmaceutical practice.	Mathematics and Biostatistics	Statistical Study	100% of the students get 75% or more on the rubric.

Description of Program Learning Outcome Assessment Method

Number	Detailed Description of Assessment
2	Do a statistical study of a real-life problem by testing an appropriate statistical hypothesis in the 15th week.

Assessment Rubric of the Program Learning Outcome

	Weak (1 pt.**)** Student is very confused and does not understand the topic, nor is able to clearly grasp how to apply it or when to use it.	**Not Bad (**2 pts**)** Student has a decent grasp of the process but makes some major mistakes.	**Good (**3 pts**)** Student is almost perfect in their understanding of the topic, with some minor confusion or mistakes.	**Excellent (**4 pts**)** Student understands the concept perfectly.
State Hypotheses Student should state both hypotheses using the correct parameter, signs, and number on right-hand side	Not all hypotheses are stated.	Hypotheses are clearly stated with major errors.	Hypotheses are clearly stated with minor errors.	Hypotheses are clearly and correctly stated.
Compute Test Statistic Student should use correct test statistic and formula	An inappropriate test statistic is used.	An appropriate test statistic is used and computed with major errors.	An appropriate test statistic is used and computed with minor errors.	An appropriate test statistic is used and computed correctly.
Draw Conclusion Student should find the *p*-value or look up the critical value and use one to make a conclusion	It is unclear how a conclusion, if any, is made.	The *p*-value or critical value is determined and used to draw a conclusion. Major errors are present.	The *p*-value or critical value is determined and used to draw a conclusion. Minor errors are present.	The *p*-value or critical value is correctly determined and used to draw a correct conclusion.
Interpret Student should interpret the conclusion in layman's terms	Interpretation is out of context.	Interpretation is in context, with major errors.	Interpretation is in context, with minor errors.	Interpretation is correctly and clearly stated in context.