

BIOS6902: STATISTICAL INFERENCE

Effective Term

Semester A 2025/26

Part I Course Overview

Course Title

Statistical Inference

Subject Code

BIOS - Biostatistics

Course Number

6902

Academic Unit

Biostatistics (BIOS)

College/School

College of Computing (CC)

Course Duration

One Semester

Credit Units

3

Level

P5, P6 - Postgraduate Degree

Medium of Instruction

English

Medium of Assessment

English

Prerequisites

Nil

Precursors

Nil

Equivalent Courses

Nil

Exclusive Courses

Nil

Part II Course Details

Abstract

Recommended background for this course is exposure to an introductory mathematical treatment of the fundamental principles of probability theory (e.g., as covered in BIOS5800) which provide the foundations for statistical inference. After

a brief review of these principles, the course covers point estimation, including evaluation of estimators and methods of estimation, interval estimation, and hypothesis testing, including power calculations and likelihood ratio testing.

Course Intended Learning Outcomes (CILOs)

CILOs		Weighting (if app.)	DEC-A1	DEC-A2	DEC-A3
1	Understand the fundamental techniques of statistical inference	40	x	x	
2	Ability to develop and fit statistical models for applications involving biomedical and public health data	40	x	x	x
3	Appreciate the need for rigorous statistical inference in science	20	x	x	x

A1: Attitude

Develop an attitude of discovery/innovation/creativity, as demonstrated by students possessing a strong sense of curiosity, asking questions actively, challenging assumptions or engaging in inquiry together with teachers.

A2: Ability

Develop the ability/skill needed to discover/innovate/create, as demonstrated by students possessing critical thinking skills to assess ideas, acquiring research skills, synthesizing knowledge across disciplines or applying academic knowledge to real-life problems.

A3: Accomplishments

Demonstrate accomplishment of discovery/innovation/creativity through producing /constructing creative works/new artefacts, effective solutions to real-life problems or new processes.

Learning and Teaching Activities (LTAs)

LTAs	Brief Description	CILO No.	Hours/week (if applicable)	
1	Teaching	Learning through teaching based on lectures	1, 2, 3	3 hours/ week
2	Assignments	Learning through assignments allows students to perform critical problem analysis and develop hands-on skills involving statistical inference	1, 2, 3	

Assessment Tasks / Activities (ATs)

ATs	CILO No.	Weighting (%)	Remarks ("- " for nil entry)	Allow Use of GenAI?	
1	Assignments	1, 2, 3	30	-	Yes
2	Midterm/quizzes	1, 2, 3	20	-	No
3	Participation	1, 2, 3	10	-	No

Continuous Assessment (%)

60

Examination (%)

40

Examination Duration (Hours)

2

Minimum Continuous Assessment Passing Requirement (%)

40

Minimum Examination Passing Requirement (%)

35

Additional Information for ATs

To pass the course, students are required to obtain a minimum of 40% in continuous assessment and a minimum of 35% in the examination.

Assessment Rubrics (AR)

Assessment Task

Assignments (for students admitted before Semester A 2022/23 and in Semester A 2024/25 & thereafter)

Criterion

Problem solving skills

Excellent

(A+, A, A-) Consistently exhibits adept comprehension of statistical inference principles and their practical implementation

Good

(B+, B, B-) Sufficiently applies statistical inference concepts to moderately complex problems

Fair

(C+, C, C-) Possesses a moderate understanding of statistical inference, enabling the application of these concepts to solve intermediate-level problems.

Marginal

(D) Displays basic grasp of statistical inference concepts and their application to straightforward problems.

Failure

(F) Shows limited comprehension of statistical inference concepts and lacks the ability to apply them to problem-solving

Assessment Task

Quizzes (for students admitted before Semester A 2022/23 and in Semester A 2024/25 & thereafter)

Criterion

Problem solving based on comprehensive understanding

Excellent

(A+, A, A-) Reliably utilizes statistical inference concepts and methods to tackle intricate problems.

Good

(B+, B, B-) Sufficiently employs statistical inference concepts and methods to address moderately complex problems

Fair

(C+, C, C-) Utilizes statistical inference concepts and methods adeptly to address problems of intermediate complexity.

Marginal

(D) Applies statistical inference concepts and methods with limited effectiveness to solve simple problems

Failure

(F) Incapable or inept at applying statistical inference concepts and methods to problem-solving

Assessment Task

Midterm Exam (for students admitted before Semester A 2022/23 and in Semester A 2024/25 & thereafter)

Criterion

Problem solving based on comprehensive understanding

Excellent

(A+, A, A-) Exhibits a thorough grasp of statistical inference concepts and effectively applies them to intricate problems

Good

(B+, B, B-) Displays sufficient understanding of statistical inference concepts and effectively applies them to moderately complex problems

Fair

(C+, C, C-) Exhibits a moderate level of comprehension in statistical inference, adeptly applying these concepts to intermediate-level problems.

Marginal

(D) Shows basic comprehension of statistical inference concepts and applies them to simple problems

Failure

(F) Displays limited grasp of statistical inference concepts and lacks the ability to apply them to problem-solving

Assessment Task

Final Exam (for students admitted before Semester A 2022/23 and in Semester A 2024/25 & thereafter)

Criterion

Problem solving based on comprehensive understanding

Excellent

(A+, A, A-) Consistently exhibits a deep understanding of statistical inference concepts and effectively applies them to complex problems

Good

(B+, B, B-) Effectively applies statistical inference concepts to moderately complex problems, demonstrating sufficient understanding

Fair

(C+, C, C-) Employs statistical inference concepts with a moderate understanding to effectively address intermediate-level problems.

Marginal

(D) Applies statistical inference concepts to simple problems with a basic understanding

Failure

(F) Lacks understanding of statistical inference concepts and cannot apply them to problem-solving

Assessment Task

Participation (for students admitted before Semester A 2022/23 and in Semester A 2024/25 & thereafter)

Criterion

Communication skills

Excellent

(A+, A, A-) Engages actively in class discussions, group work, and activities

Good

(B+, B, B-) Participates intermittently or passively in class discussions, group work, and activities

Fair

(C+, C, C-) Participates moderately in class discussions, group projects, and activities.

Marginal

(D) Engages minimally in class discussions, group work, and activities

Failure

(F) Infrequently engages in class discussions, group work, and activities

Assessment Task

Assignments (for students admitted from Semester A 2022/23 to Summer Term 2024)

Criterion

Problem solving skills

Excellent

(A+, A, A-) Consistently exhibits adept comprehension of statistical inference principles and their practical implementation

Good

(B+, B) Sufficiently applies statistical inference concepts to moderately complex problems

Marginal

(B-, C+, C) Displays basic grasp of statistical inference concepts and their application to straightforward problems.

Failure

(F) Shows limited comprehension of statistical inference concepts and lacks the ability to apply them to problem-solving

Assessment Task

Quizzes (for students admitted from Semester A 2022/23 to Summer Term 2024)

Criterion

Problem solving based on comprehensive understanding

Excellent

(A+, A, A-) Reliably utilizes statistical inference concepts and methods to tackle intricate problems.

Good

(B+, B) Sufficiently employs statistical inference concepts and methods to address moderately complex problems

Marginal

(B-, C+, C) Applies statistical inference concepts and methods with limited effectiveness to solve simple problems

Failure

(F) Incapable or inept at applying statistical inference concepts and methods to problem-solving

Assessment Task

Midterm Exam (for students admitted from Semester A 2022/23 to Summer Term 2024)

Criterion

Problem solving based on comprehensive understanding

Excellent

(A+, A, A-) Exhibits a thorough grasp of statistical inference concepts and effectively applies them to intricate problems

Good

(B+, B) Displays sufficient understanding of statistical inference concepts and effectively applies them to moderately complex problems

Marginal

(B-, C+, C) Shows basic comprehension of statistical inference concepts and applies them to straightforward problems

Failure

(F) Displays limited grasp of statistical inference concepts and lacks the ability to apply them to problem-solving

Assessment Task

Final Exam (for students admitted from Semester A 2022/23 to Summer Term 2024)

Criterion

Problem solving based on comprehensive understanding

Excellent

(A+, A, A-) Consistently exhibits a deep understanding of statistical inference concepts and effectively applies them to complex problems

Good

(B+, B) Effectively applies statistical inference concepts to moderately complex problems, demonstrating sufficient understanding

Marginal

(B-, C+, C) Applies statistical inference concepts to simple problems with a basic understanding

Failure

(F) Lacks understanding of statistical inference concepts and cannot apply them to problem-solving

Assessment Task

Participation (for students admitted from Semester A 2022/23 to Summer Term 2024)

Criterion

Communication skills

Excellent

(A+, A, A-) Engages actively in class discussions, group work, and activities

Good

(B+, B) Participates intermittently or passively in class discussions, group work, and activities

Marginal

(B-, C+, C) Engages minimally in class discussions, group work, and activities

Failure

(F) Infrequently engages in class discussions, group work, and activities

Part III Other Information**Keyword Syllabus**

Point estimation, interval estimation, hypothesis testing, power calculations, likelihood ratio tests.

Reading List**Compulsory Readings**

Title	
1	Statistical Inference by George Casella and Roger L. Berger (Cengage Learning; 2nd edition)

Additional Readings

Title	
1	All of Statistics: A Concise Course in Statistical Inference (Springer Texts in Statistics) by Larry Wasserman