



Course Specification

— (Postgraduate)

Course Title: Bayesian Statistics

Course Code: 202592-3

Program: M.Sc. in Statistics

Department: Mathematics and Statistics

College: Science

Institution: Taif University

Version: 2023

Last Revision Date: 7/4/1445



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A. General information about the course:

1. Course Identification:

1. Credit hours: (3)

2. Course type

A. University College Department Track

B. Required Elective

3. Level/year at which this course is offered: (First level/ First year)

4. Course general Description:

What is Bayesian statistics? – Contrasts with classical inference Bayes' theorem – Prior distribution - Posterior distribution - Conjugate distributions – Bayesian inference – Point and interval estimation – Predictive distribution - Bayesian model choice - Bayes factor.

5. Pre-requirements for this course (if any):

6. Pre-requirements for this course (if any):

7. Course Main Objective(s):

After careful study of this course, student should be able to do the following:

- 1- Provide an introduction to the theory and methods of Bayesian statistics.
- 2- Determine the Prior and posterior distributions using the Bayesian method.
- 3- Determine inference about parameters and hypotheses by Bayesian statistics.
- 4- Understand the properties of the estimators using Bayesian rules..

2. Teaching Mode: (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	3	100%
2	E-learning		
3	Hybrid <ul style="list-style-type: none"> • Traditional classroom • E-learning 		
4	Distance learning		





3. Contact Hours: (based on the academic semester)

No	Activity	Contact Hours
1.	Lectures	45
2.	Laboratory/Studio	
3.	Field	
4.	Tutorial	
5.	Others (specify).....	
	Total	

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods:

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	Knowledge and understanding			
1.1	Recognize the fundamentals of Bayesian statistics.	K1	<ul style="list-style-type: none"> •Lectures •Group discussions 	<ul style="list-style-type: none"> •Quizzes •Exams •Assignments
1.2	Outline the Posterior distribution - Conjugate distributions – Bayesian inference.	K1	<ul style="list-style-type: none"> •Lectures •Group discussions 	<ul style="list-style-type: none"> •Quizzes •Exams •Assignments
1.3	Outline statistical properties of the estimators.	K2	<ul style="list-style-type: none"> •Lectures •Group discussions 	<ul style="list-style-type: none"> •Quizzes •Exams •Assignments
2.0	Skills			
2.1	Apply the Bayesian methods to estimate the parameters.	S2	<ul style="list-style-type: none"> •Lectures •Group discussions 	<ul style="list-style-type: none"> •Quizzes •Exams •Assignments
2.2	Evaluate, and compare between estimators.	S4	<ul style="list-style-type: none"> •Lectures •Group discussions 	<ul style="list-style-type: none"> •Quizzes •Exams •Assignments
...				
3.0	Values, autonomy, and responsibility			
3.1	Participate effectively within groups and	V1	<ul style="list-style-type: none"> •Lectures •Group discussions 	<ul style="list-style-type: none"> •Quizzes •Exams •Assignments



Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
	independently.			
3.2	Express mathematical and statistical ideas orally and in writing	V4	<ul style="list-style-type: none"> •Lectures •Group discussions 	<ul style="list-style-type: none"> •Quizzes •Exams •Assignments
...				

C. Course Content:

No	List of Topics	Contact Hours
1-3	Bayesian statistics, Introduction to Bayes' theorem, using Bayes' theorem for parametric inference.	9
4-6	Types of prior distribution. Posterior distributions, Conjugate Bayesian: Definition of conjugate family, role of prior and likelihood in the posterior.	9
7-9	Bayesian inference – Point and interval estimation>	9
10-12	Predictive distribution, Bayesian model choice.	9
13-15	Bayes factor, Applications of using Bayesian method for estimating parameter.	9
Total		45

D. Students Assessment Activities:

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Quizzes + Homeworks+ oral presentation +written test+ group project	Continues	30%
2.	Final exam	16 th	70%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.)

E. Learning Resources and Facilities:

1. References and Learning Resources:

Essential References	<ul style="list-style-type: none"> • Anthony O'Hagan, Kendall's Advanced Theory of Statistics Volume 2B Bayesian Inference, 1994. 512.795 KEN
Supportive References	
Electronic Materials	https://people.bath.ac.uk/masss/ma40189.html
Other Learning Materials	Peter M. Lee, Bayesian Statistics: an introduction, Fourth





	<p style="text-align: center;">Edition, 2012.</p> <p>Very readable, introductory text. The full text is available as an e-book here. The Third Edition is also available in the library. Further details about the book can be found here. This includes all the exercises in the book and their solutions.</p>
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2. Educational and Research Facilities and Equipment Required:

Items	Resources
<p style="text-align: center;">facilities</p> <p>(Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)</p>	<p>Lecture halls, containing white boards, and electronic monitors - The seats fit the number of students - Laboratories equipped with suitable numbers of computers</p>
<p style="text-align: center;">Technology equipment</p> <p>(Projector, smart board, software)</p>	Data Show
<p style="text-align: center;">Other equipment</p> <p>(Depending on the nature of the specialty)</p>	Wi-Fi internet connections

F. Assessment of Course Quality:

Assessment Areas/Issues	Assessor	Assessment Methods
Quality of learning resources	Students	Indirect
Effectiveness of teaching and assessment	Students	Indirect
Extent of achievement of course learning outcomes	Peer reviewer	Direct
Quality of learning resources	Students	Indirect
Effectiveness of teaching and assessment	Students	Indirect

Assessor (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify))

Assessment Methods (Direct, Indirect)

G. Specification Approval Data:

COUNCIL /COMMITTEE	Department of Mathematics and Statistics
REFERENCE NO.	
DATE	7-4-1445H

