# Course Specification
— (Postgraduate)

| | |
|---|---|
| **Course Title:** | **Methods of assessing statistical models** |
| **Course Code:** | **202672-3** |
| **Program:** | **M.Sc. in Statistics** |
| **Department:** | **Mathematics and Statistics** |
| **College:** | **Science** |
| **Institution:** | **Taif University** |
| **Version:** | 2023 |
| **Last Revision Date:** | 7/4/1445 |

## Table of Contents

## 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: (N/A)**

**4. Course general Description:**

This course contains some very important topics in statistics. These topics are:

Assessing goodness of fit of a model - Residual analysis technique – predictive distribution method – Selecting between models – Posterior probabilities - Bayes factor method – Methods for estimating 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. Determine posterior probabilities.
2. Understand how to select from models.
3. Understand how to Assess the goodness of fit of a model.
4. Understand the residual analysis technique.
5. Understand Bayes factor method.
6. Determine Bayes factor.

### 2. Teaching Mode: (mark all that apply)

| No | Mode of Instruction | Contact Hours | Percentage |
|----|---------------------|---------------|------------|
| 1 | Traditional classroom | 3 | 100% |
| 2 | E-learning | | |
| 3 | Hybrid<br>• Traditional classroom<br>• 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** | 45 |

## 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** Bayes factor method. | K1 | • Lectures<br>Group discussions | • Quizzes<br>• Exams<br>Assignments |
| 1.2 | **Outline** how to select from models. | K2 | • Lectures<br>Group discussions | • Quizzes<br>• Exams<br>Assignments |
| 1.3 | **Outline** the residual analysis technique. | K2 | • Lectures<br>Group discussions | • Quizzes<br>• Exams<br>Assignments |
| 1.4 | **Describe** Assessing the goodness of fit of a model. | K3 | • Lectures<br>Group discussions | • Quizzes<br>• Exams<br>Assignments |
| **2.0** | **Skills** | | | |
| 2.1 | **Apply** the studied methods to find the Bayes factor. | S2 | • Lectures<br>Group discussions | • Quizzes<br>• Exams<br>Assignments |
| 2.2 | **Evaluate,** the posterior probabilities | S4 | • Lectures<br>Group discussions | • Quizzes<br>• Exams<br>Assignments |
| **3.0** | **Values, autonomy, and responsibility** | | | |
| 3.1 | **Participate** effectively within groups and independently. | V1 | Projects | Through the oral presentation of the projects. |

| Code | Course Learning Outcomes | Code of CLOs aligned with program | Teaching Strategies | Assessment Methods |
|------|--------------------------|-----------------------------------|---------------------|--------------------|
| 3.2 | **Express mathematical and statistical ideas orally and in writing.** | V4 | Projects | Through the oral presentation of the projects. |

## C. Course Content:

| No | List of Topics | Contact Hours |
|----|----------------|---------------|
| 1-2 | **Assessing goodness of fit of a model.** | 6 |
| 3-4 | **Residual analysis technique.** | 6 |
| 5-6 | **Predictive distribution method .** | 6 |
| 7-9 | **Selecting between models.** | 9 |
| 10-11 | **Posterior probabilities.** | 6 |
| 12-13 | **Bayes factor method.** | 6 |
| 14-15 | **Methods for estimating Bayes factor** | 6 |
| **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** | Ralph B. D'Agostino, Michael A. Stephens, Goodness-of-Fit Techniques, (1986), Marcel Dekker |
| **Supportive References** | PETER CONGDON, Bayesian Statistical Modelling, 2 nd edition, (2006), Wiley. |
| **Electronic Materials** | |
| **Other Learning Materials** | **Blackboard system** |

### 2. Educational and Research Facilities and Equipment Required:

| Items | Resources |
|-------|-----------|
| **facilities** (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.) | **Lecture halls, containing white boards, and electronic monitors - The seats fit the number of students - Laboratories equipped with** |

| Items | Resources |
|---|---|
| | suitable numbers of computers |
| **Technology equipment**<br>(Projector, smart board, software) | **Data Show** |
| **Other equipment**<br>(Depending on the nature of the specialty) | **Wi-Fi internet connections** |

## F. Assessment of Course Quality:

| Assessment Areas/Issues | Assessor | Assessment Methods |
|---|---|---|
| **Effectiveness of teaching** | **Students, Program Leader** | **Direct& Indirect** |
| **Effectiveness of students assessment** | **Faculty, Program Leader** | **Direct** |
| **Quality of learning resources** | **Students, Faculty** | **Indirect** |
| **The extent to which CLOs have been achieved** | **Faculty** | **Direct& Indirect** |
| **Other** | | |

**Assessor** (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)
**Assessment Methods** (Direct, Indirect)

## G. Specification Approval Data:

| COUNCIL /COMMITTEE | DEPARTMENT COUNCIL |
|---|---|
| REFERENCE NO. | |
| DATE | 7/4/1445 |

قسم الرياضيات والإحصاء
Mathematics and Statistics
Department
TU
جامعة الطائف
TAIF UNIVERSITY