



**ATTACHMENT 5.**

## **T6. COURSE SPECIFICATIONS (CS)**



هيئة تقويم التعليم  
Education Evaluation Commission

## Course Specifications

|  |       |
|--|-------|
| Institution: <a href="#">King Saud University</a>  | Date: |
| College/Department : <a href="#">College of Sciences/ Department of Statistics and Operations Research</a> |       |

### A. Course Identification and General Information

|  |                                     |                                     |                                  |                                  |                                     |                          |                  |                      |               |                                     |                  |                                  |                   |                                     |                  |                                 |          |                          |                  |                      |
|--|-------------------------------------|-------------------------------------|----------------------------------|----------------------------------|-------------------------------------|--------------------------|------------------|----------------------|---------------|-------------------------------------|------------------|----------------------------------|-------------------|-------------------------------------|------------------|---------------------------------|----------|--------------------------|------------------|----------------------|
| 1. Course title and code:<br><i>Time Series and Forecasting (STAT-336)</i>   |                                     |                                     |                                  |                                  |                                     |                          |                  |                      |               |                                     |                  |                                  |                   |                                     |                  |                                 |          |                          |                  |                      |
| 2. Credit hours:   |                                     |                                     |                                  |                                  |                                     |                          |                  |                      |               |                                     |                  |                                  |                   |                                     |                  |                                 |          |                          |                  |                      |
| 3. Program(s) in which the course is offered.<br>(If general elective available in many programs indicate this rather than list programs)  |                                     |                                     |                                  |                                  |                                     |                          |                  |                      |               |                                     |                  |                                  |                   |                                     |                  |                                 |          |                          |                  |                      |
| 4. Name of faculty member responsible for the course:<br><a href="#">Prof. Ibrahim A. Alwasel</a>  |                                     |                                     |                                  |                                  |                                     |                          |                  |                      |               |                                     |                  |                                  |                   |                                     |                  |                                 |          |                          |                  |                      |
| 5. Level/year at which this course is offered: <a href="#">6</a>   |                                     |                                     |                                  |                                  |                                     |                          |                  |                      |               |                                     |                  |                                  |                   |                                     |                  |                                 |          |                          |                  |                      |
| 6. Pre-requisites for this course (if any): <a href="#">stat 332</a>   |                                     |                                     |                                  |                                  |                                     |                          |                  |                      |               |                                     |                  |                                  |                   |                                     |                  |                                 |          |                          |                  |                      |
| 7. Co-requisites for this course (if any):   |                                     |                                     |                                  |                                  |                                     |                          |                  |                      |               |                                     |                  |                                  |                   |                                     |                  |                                 |          |                          |                  |                      |
| 8. Location if not on main campus:   |                                     |                                     |                                  |                                  |                                     |                          |                  |                      |               |                                     |                  |                                  |                   |                                     |                  |                                 |          |                          |                  |                      |
| 9. Mode of Instruction (mark all that apply):<br><table><tr><td>a. traditional classroom</td><td><input checked="" type="checkbox"/></td><td>What percentage?</td><td><input type="text" value="60%"/></td></tr><tr><td>b. blended (traditional and online)</td><td><input type="checkbox"/></td><td>What percentage?</td><td><input type="text"/></td></tr><tr><td>c. e-learning</td><td><input checked="" type="checkbox"/></td><td>What percentage?</td><td><input type="text" value="30%"/></td></tr><tr><td>d. correspondence</td><td><input checked="" type="checkbox"/></td><td>What percentage?</td><td><input type="text" value="10"/></td></tr><tr><td>f. other</td><td><input type="checkbox"/></td><td>What percentage?</td><td><input type="text"/></td></tr></table> | a. traditional classroom            | <input checked="" type="checkbox"/> | What percentage?                 | <input type="text" value="60%"/> | b. blended (traditional and online) | <input type="checkbox"/> | What percentage? | <input type="text"/> | c. e-learning | <input checked="" type="checkbox"/> | What percentage? | <input type="text" value="30%"/> | d. correspondence | <input checked="" type="checkbox"/> | What percentage? | <input type="text" value="10"/> | f. other | <input type="checkbox"/> | What percentage? | <input type="text"/> |
| a. traditional classroom   | <input checked="" type="checkbox"/> | What percentage?                    | <input type="text" value="60%"/> |                                  |                                     |                          |                  |                      |               |                                     |                  |                                  |                   |                                     |                  |                                 |          |                          |                  |                      |
| b. blended (traditional and online)  | <input type="checkbox"/>            | What percentage?                    | <input type="text"/>             |                                  |                                     |                          |                  |                      |               |                                     |                  |                                  |                   |                                     |                  |                                 |          |                          |                  |                      |
| c. e-learning  | <input checked="" type="checkbox"/> | What percentage?                    | <input type="text" value="30%"/> |                                  |                                     |                          |                  |                      |               |                                     |                  |                                  |                   |                                     |                  |                                 |          |                          |                  |                      |
| d. correspondence  | <input checked="" type="checkbox"/> | What percentage?                    | <input type="text" value="10"/>  |                                  |                                     |                          |                  |                      |               |                                     |                  |                                  |                   |                                     |                  |                                 |          |                          |                  |                      |
| f. other   | <input type="checkbox"/>            | What percentage?                    | <input type="text"/>             |                                  |                                     |                          |                  |                      |               |                                     |                  |                                  |                   |                                     |                  |                                 |          |                          |                  |                      |
| Comments:  |                                     |                                     |                                  |                                  |                                     |                          |                  |                      |               |                                     |                  |                                  |                   |                                     |                  |                                 |          |                          |                  |                      |

## B Objectives

1. What is the main purpose for this course?

*To provide students with the knowledge, methods and skills to analyze data that are collected over time. Also the students through this course will be able to apply statistical methods to choose suitable models that best fit data. Those models can be used for control and prediction for future observations.*

2. Briefly describe any plans for developing and improving the course that are being implemented. (e.g. increased use of IT or web based reference material, changes in content as a result of new research in the field)

*a) introduce more applications and use of real life data.*

*b) extended usage of statistical packages in lectures or tutorial.*

*c) build on the knowledge obtained from other courses like stat332, Stat438 and Stat439*

## C. Course Description (Note: General description in the form used in Bulletin or handbook)

Course Description:

### 1. Topics to be Covered

| List of Topics   | No. of Weeks | Contact hours |
|--|--------------|---------------|
| Introduction: Definitions and Examples.<br>trend – seasonality – cyclical  | 1            | 2             |
| Transformation: Differences method – Seasonal adjustment.  | 1            | 2             |
| Forecasting: How to forecast future - adequacy of a forecast - regression forecasting against time series forecasting  | 1            | 2             |
| Some adequacy measures (MAD, MSE, MAPE).   | 1            | 2             |
| Decomposition and smoothing of times series: moving averages - exponential smoothing.  | 1            | 2             |
| Stationary Time Series Models: Auto-Regressive processes (AR(1), AR(2), AR(p)), Moving Average processes (MA(1), MA(2), MA(q)), The mixed Autoregressive-Moving Average Model ARMA(p,q). | 2            | 4             |
| Forecasting: Minimum Mean Square Error Forecasts for ARMA and ARIMA models.  | 2            | 4             |
| Forecasting and prediction limits and updating forecasts.  | 1            | 2             |
| ARIMA(p,d,q) models: Autocorrelation and partial autocorrelation functions - identification of appropriate model   | 2            | 4             |

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|---|---|---|
| Fitting models to real and simulated data sets. Diagnostic checks on the residuals.                                 | 1 | 2 |
| Case studies: training on how to analyze real life data sets using the statistical package MINITAB - write reports. | 2 | 4 |

2. Course components (total contact hours and credits per semester):

|               |         | Lecture | Tutorial | Laboratory/<br>Studio | Practical | Other: | Total |
|---------------|---------|---------|----------|-----------------------|-----------|--------|-------|
| Contact Hours | Planned | 30      | 30       |                       |           |        | 60    |
|               | Actual  | 30      | 30       |                       |           |        | 60    |
| Credit        | Planned | 30      | 15       |                       |           |        | 45    |
|               | Actual  | 30      | 30       |                       |           |        | 60    |

3. Additional private study/learning hours expected for students per week.

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4. Course Learning Outcomes in NQF Domains of Learning and Alignment with Assessment Methods and Teaching Strategy

**On the table below are the five NQF Learning Domains, numbered in the left column.**

**First**, insert the suitable and measurable course learning outcomes required in the appropriate learning domains (see suggestions below the table). **Second**, insert supporting teaching strategies that fit and align with the assessment methods and intended learning outcomes. **Third**, insert appropriate assessment methods that accurately measure and evaluate the learning outcome. Each course learning outcomes, assessment method, and teaching strategy ought to reasonably fit and flow together as an integrated learning and teaching process. (Courses are not required to include learning outcomes from each domain.)

| Code #     | NQF Learning Domains<br>And Course Learning Outcomes   | Course Teaching Strategies  | Course Assessment Methods                                      |
|------------|--|---|--|
| <b>1.0</b> | <b>Knowledge</b>   |   |  |
| 1.1        | <i>Define Basic features of a time series data</i>   | <i>Course work, training in the tutorial lecture, exercises and exams</i> | <i>Exams, Thematic Reports and Work Assignments Evaluation</i> |
| 1.2        | <i>Realize the required actions to be taken to prepare the data for analysis</i>   | <i>Course work, training in the tutorial lecture, exercises and exams</i> | <i>Exams, Thematic Reports and Work Assignments Evaluation</i> |
| 1.3        | <i>Define the autocorrelation and the partial autocorrelation structure of the data, and propose a suitable model for analysis</i> | <i>Course work, training in the tutorial lecture, exercises and exams</i> | <i>Exams, Thematic Reports and Work Assignments Evaluation</i> |

|            |  |   |  |
|------------|--|---|--|
| 1.4        | <i>Study the forecasting accuracy of the selected model(s)</i>                             | <i>Course work, training in the tutorial lecture, exercises and exams</i> | <i>Exams, Thematic Reports and Work Assignments Evaluation</i> |
| <b>2.0</b> | <b>Cognitive Skills</b>  |   |  |
| 2.1        | <i>Develop the ability of how to utilize the theoretical concepts in application form.</i> | <i>Course work, training in the tutorial lecture, exercises and exams</i> | <i>Evaluation of Activates</i>                                 |
| <b>3.0</b> | <b>Interpersonal Skills &amp; Responsibility</b>   |   |  |
| 3.1        | <i>Ability to Express Opinion and Criticize peers</i>                                      |   | <i>Peer and Instructor Evaluation</i>                          |
| 3.2        | <i>Ability to Bear Responsibility and Cope with Negative Criticism from Others</i>         |   | <i>Peer and Instructor Evaluation</i>                          |
| 3.3        | <i>Ability to Use Information Media</i>  |   | <i>Instructor Evaluation</i>                                   |
| 3.4        | <i>Ability to Make Search on Scientific Subjects</i>                                       |   | <i>Instructor Evaluation</i>                                   |
| <b>4.0</b> | <b>Communication, Information Technology, Numerical</b>                                    |   |  |
| 4.1        | <i>Communicate with stakeholders and community</i>   |   |  |
| 4.2        | <i>Using IT for learning and simulation</i>  |   |  |
| <b>5.0</b> | <b>Psychomotor (not applicable)</b>  |   |  |
| 5.1        |  |   |  |
| 5.2        |  |   |  |

#### 5. Schedule of Assessment Tasks for Students During the Semester

|   | Assessment task (i.e., essay, test, quizzes, group project, examination, speech, oral presentation, etc.) | Week Due | Proportion of Total Assessment |
|---|---|----------|--------------------------------|
| 1 | Test I  | 7        | 10%                            |
| 2 | Test II   | 13       | 10%                            |
| 3 | Project   | 4        | 5%                             |
| 4 | homework  | 1-14     | 5%                             |
| 5 | Data analysis Project   | 10       | 20%                            |
| 6 | Final Exam  | 16       | 40%                            |
| 7 | Tutorial  | 2-15     | 10%                            |
| 8 |   |          |                                |

#### **D. Student Academic Counseling and Support**

1. Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice. (include amount of time teaching staff are expected to be available each week)

*Four hours (weekly) for office-hour-consultation are assigned and announced at the beginning of each semester.*

#### **E Learning Resources**

1. List Required Textbooks

- *Cryer, D. and Chan, K., Time Series Analysis, (latest edition), Springer.*
- *Makridakis, S., Wheelright, S., and McGee, V., Forecasting, Methods and applications (latest edition), Wiley.*
- *Chatfield, C., The Analysis of Time Series, (latest edition), Chapman and Hall.*

2. List Essential References Materials (Journals, Reports, etc.)

3. List Electronic Materials, Web Sites, Facebook, Twitter, etc.

4. Other learning material such as computer-based programs/CD, professional standards or regulations and software.

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## F. Facilities Required

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| Indicate requirements for the course including size of classrooms and laboratories (i.e. number of seats in classrooms and laboratories, extent of computer access, etc.) |
| 1. Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)<br><i>A computer laboratory equipped with required software</i>                               |
| 2. Technology resources (AV, data show, Smart Board, software, etc.)<br><i>data show, Smart Board, software</i>   |
| 3. Other resources (specify, e.g. if specific laboratory equipment is required, list requirements or attach list)   |

## G Course Evaluation and Improvement Processes

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| 1. Strategies for Obtaining Student Feedback on Effectiveness of Teaching<br><i>At the end of the semester students fill in a detailed form for evaluating all aspects of the course, beside listing any verbal comments received from the students.</i>   |
| 2. Other Strategies for Evaluation of Teaching by the Instructor or by the Department<br><i>All comments by students, together with instructor's evaluation of students performance lead to improvement of course implementation.</i>  |
| 3. Processes for Improvement of Teaching<br><i>Receiving feedback from students and demonstrator on difficulties faced, so that next semester those could be evaluated and avoided</i>   |
| 4. Processes for Verifying Standards of Student Achievement (e.g. check marking by an independent member teaching staff of a sample of student work, periodic exchange and remarking of tests or a sample of assignments with staff at another institution)  |
| 5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for improvement.<br><i>After semester has finished, all comments by students, together with instructor's evaluation of students performance lead to improvement of course implementation the next semester.</i> |

Name of Course Instructor: *Prof. Ibrahim A. Alwasel*

Signature: \_\_\_\_\_ Date Specification Completed: *5/2/2018*

Program Coordinator: *Prof. Ibrahim A. Alwasel*

Signature: \_\_\_\_\_ Date Received: *5/2/2018*