**KING FAHD UNIVERSITY OF PETROLEUM & MINERALS**
**DEPARTMENT OF MATHEMATICS & STATISTICS**
**DHAHRAN, SAUDI ARABIA**

# STAT 512: Demographic Methods - Term 241 (3-0-3) 8.00am-8.50am UTR

**Course Description:**

Demographic fundamentals, Measurement of mortality, Life table, Multiple decrement life table, Analysis of Marriage, Measurement of fertility, Parity progression, Determinants of fertility, Population growth, Models of population structure, Survival analysis, Cox proportional hazards (single and multiple events), Competing events, Parametric demographic models.

**Prerequisites**: Graduate Standing

**Course Objective:**

The main objective of course is to

- present demographic factors and models
- explain different methods of parameters estimation and inference
- demonstrate the use of statistical package(s) to analyze datasets

**Course Learning Outcomes:**

By the end of this course, students will be able to:

- Develop cox survival regression and other demographic models
- Perform residuals analysis and inference about model parameters
- Use statistical packages to analyze real data sets
- Use the fitted model for prediction/forecasting

**Textbook and Package:**

1. Kenneth Wachter (2014). Essential Demographic Methods. Harvard University Press.

**Reference:**

1. T. Rowland (2003) Demographic Methods and Concepts. Oxford University Press, Oxford, UK
2. SH Preston (2000). Demography - Measuring and Modeling Population Processes. John Wiley and Sons Ltd

**Instructor**: Dr. Mohammad H. Omar **Office:** Bldg – 5, room – 508. **Phone:** 2471
**E-mail: omarmh@kfupm.edu.sa (Not by WebCT/Blackboard email)**

**Office Hours:** U: 9.00am-10:10am and R: 12.20pm–1.30pm or by appointment on MS Teams chat.

## *Assessment*

Assessment for this course will be based on attendance, homework, term report, a midterm exams and a comprehensive final exam, as in the following:

| Activity | Weight |
|---|---|
| Classwork (Participation, Quizzes, and Assignments) | 15% |
| Term Paper Project<br>**Tuesday Nov 7 (week 11)** | 20% |
| MidTerm Exam (Topics 1, 2 & 3)<br>**Wednesday (Sep 25 – week 5), 6.00 pm** | 30% |
| Final Exam (Comprehensive)<br>**As announced by Registrar** | 35% |

**IMPORTANT NOTE on GRADES:** There is no quota on the number of students who can get an A+ grade.

- ✓ ***Attendance*** on time is ***very*** important. Mostly, attendance will be checked within the ***first five minutes*** of the class. Entering the class after that, is considered as late (**2 lates= 1 Absence**) and
- ✓ **More than 10 minutes late = Absence** (regardless of any excuse).

*General Notes:*

- Students are required to carry **pens**, **note-taking equipment** and a **calculator** to **EVERY lecture and exams**. It is strongly recommended to keep a **binder** for class-notes.
- Students are also expected to bring the book, take notes and organize their solved questions in a **binder** for easy retrieval to help them in study and review for class, exams, etc
  - It is to the student's advantage to keep a binder for storing class notes, homework, and other graded assignments. Students who are **organized** will find it **easier** to find important materials when **studying for exams**.

- To successfully prepare for the exams, students MUST **solve problems** regularly and with discipline. The selected assigned problems are specifically designed to prepare you for major and final exams. So, it is expected that you complete these problems **step-by-step** and with comprehension.
  - If you happen to stumble upon a solution manual somewhere, remember 2 important points. (1) Due to publishing costs and deadlines, these solutions are brief and may have mistakes and (2) in your career as an actuary and your exams and quizzes in this class, you are expected to know every step to a problem and to know if a solution is incorrect. Thus, the best way to solve problem is without these brief solutions.
- ***Never round*** your intermediate results to problems when doing your calculations. This will cause you to lose calculation accuracy. Your answers may then be different from the SOA exam key even when you use the right procedure.
- For every exam, so you need to bring with you ***pens***, ***pencils***, ***a sharpener***, ***an eraser***, and a ***calculator***.

**Academic Integrity**: All KFUPM policies regarding **ethics** and **academic honesty** apply to this course.

**Exams:**

**Exam Questions:** The questions of the exams are based on the examples, homework problems, and exercises in the textbook and lab manual.

**Cheating in Exams:** Cheating or any attempt of cheating by use of illegal activities, techniques and forms of fraud will result in a grade of **F** in the course along with reporting the incident to the higher university administration. Cheating in exams includes (but not restricted to)

- Looking at the papers of other students,
- Talking to other students,
- Using mobiles or any other electronic devices.

**Exam Issues:**

- No student will be allowed to take the exam without having his/her physical KFUPM ID or National/Iqama ID.
- Students are not allowed to carry mobiles, smart watches, or electronic devices to the exam halls/rooms.
- Students must take the exam in the place assigned to them.

**Missing an Exam:**

In case a student misses an exam (MidTerm Exam, or the Final Exam) for a legitimate reason (such as medical emergencies), he must bring an official excuse from Students Affairs with the "Exam Included" box checked. Otherwise, he will get zero in the missed exam.

**Attendance:** Students must adhere to the attendance policy of KFUPM. Students are expected to attend all lecture and lans.

- If a student misses a class, he is responsible for any announcement made in that class.
- A DN grade will be assigned to the eligible student after being warned twice by his/her instructor.
- A DN grade will be awarded to any student who accumulates
  - 6 unexcused absences in lectures. (20%)
  - 10 excused and unexcused absences in lecture and recitation classes. (33%)

Note:

- ***Attendance*** on time is ***very*** important. Mostly, attendance will be checked within the ***first five minutes*** of the class. Entering the class after that, is considered as late (**2 lates= 1 Absence**) and
- **More than 10 minutes late = Absence** (regardless of any excuse).
- Only University Blue paper Official excuses will be accepted as valid excuse.

**Syllabus (Tentative)**

| *Week* | *Sections* | *Topics* | *Notes* |
|---|---|---|---|
| **1** (Aug 25 - 29) | Ch 0 and 2 | **1. Demographic fundamentals** | . |
| **2** (Sept 1 - 5) | Ch 1 | **2. Population Growth** | |
| **3** (Sept 8- 12) | Ch 3 | **3. Measurement of Mortality** | |
| **4** (Sept 15- 19) | Ch 8 | **4. Survival Analysis** | |
| **5** (Sept 24- 26) | Ch 4 | **5. Measurement of Fertility** | National Holiday (Sept 22-23) |
| **Wednesday (Sep 25– week 5), 6.00pm – Midterm Exam (Topics 1, 2 & 3)** | | | |
| **6** (Sept 29 – Oct 3) | Ch 6 | **5. Analysis of Marriage** | **(2 wks):** Midterm grade reports starts. **Declare your Term paper topic: Tues Oct 1** |
| **7** (Oct 6- 10) | Ch 6 | **5. Determinants of Fertility, Parity Progression** | |
| **8 (**Oct 13- 17) | Ch 5 | **6. Models of Population Structure** | |
| **9** (Oct 20- 24) | Ch 9 | **7. Life Tables** | |
| **10** (Oct 27 - 31) | Ch 10 | **7. Multiple Decrement Life Table** | |
| **11** (Nov 3 - 7) | 8.3 and handouts | **8. Competing Events** | **Tues Nov 7**: Term Paper Report due to instructor |
| Nov 10 - 14 | **MidTerm Break** | | |
| **12** (Nov 17- 21) | 8.7 and handouts | **9. Cox Proportional Hazards (single and multiple events)** | |
| **13** (Nov 24- 28) | 8.7 and handouts | **9. Cox Proportional Hazards (single and multiple events)** | |
| **14** (Dec 1 - 5) | 8.8 and 7.7 handouts | **10. Parametric demographic models** | |
| **15** (Dec 8 - 12) | 8.8 and 7.7 handouts | **10. Parametric demographic models** | |
| **16** (Dec 15 - 16) | | **Review** | |
| Final Exam: See Registrar's schedule | | | |