جامعة الملك عبدالله
للعلوم والتقنية
King Abdullah University of
Science and Technology

# Course Syllabus: Applied Statistics and Data Analysis - AMCS 210

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| **Division** | Computer, Electrical and Mathematical Sciences & Engineering |
| **Course Number** | AMCS 210 |
| **Course Title** | Applied Statistics and Data Analysis |
| **Academic Semester** | Spring |
| **Academic Year** | 2016/2017 |
| **Semester Start Date** | 01/22/2017 |
| **Semester End Date** | 05/18/2017 |
| **Class Schedule** (Days & Time) | 02:30 PM - 04:00 PM \| Sun Wed |

## Instructor(s)

| Name | Email | Phone | Office Location | Office Hours |
|---|---|---|---|---|
| Ying Sun | ying.sun@kaust.edu.sa | +966128080644 | 4116, 1, Al-Khawarizmi (bldg. 1) | |

## Teaching Assistant(s)

| Name | Email |
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## Course Information

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| **Comprehensive Course Description** | For students outside AMCS wishing to obtain an introduction to statistical method. This course is AMCS 110 for AMCS students. Provides fundamentals of probability and statistics for data analysis in research. Topics include data collection, exploratory data analysis, random variables, common discrete and continuous distributions, sampling distributions, estimation, confidence in- tervals, hypothesis tests, elementary simulation and bootstrapping, distribution-free techniques, linear regression, analysis of variance, two-way tables, and data analysis using statistical software. |
| **Course Description from Program Guide** | Provides fundamentals of probability and statistics for data analysis in research. Topics include data collection, exploratory data analysis, random variables, common discrete and continuous distributions, sampling distributions, estimation, confidence intervals, hypoThesis tests, linear regression, analysis of variance, two (2)-way tables, and data analysis using statistical software. No degree credits for AMCS majors. |
| **Goals and Objectives** | For students outside AMCS wishing to obtain an introduction to statistical method. This course is AMCS 110 for AMCS students. Provides fundamentals of probability and statistics for data analysis in research. Topics include data collection, exploratory data analysis, random variables, common discrete and continuous distributions, sampling distributions, estimation, confidence in- tervals, hypothesis tests, elementary simulation and bootstrapping, distribution-free techniques, linear regression, analysis of variance, two-way tables, and data analysis using statistical software. |
| **Required Knowledge** | The required computer package for this class is R. Example code and datasets will be posted on the class webpage. You are welcome to use other packages, such as Matlab or Mathematica, but R has many built in functions that other more general packages lack. If you choose to use another software package, you are on your own, and be aware that many tasks may become more time-consuming. |

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| **Reference Texts** | -Tamhane, A. C. and Dunlop, D. D. (2000) Statistics and Data Analysis: From Elementary to Intermediate. Prentice Hall: Upper Saddle River, NJ. ISBN: 0-1374-4426-5 (Required)<br>-Hayter, A. J. (2012) Probability and Statistics for Engineers and Scientists, 4th edition, ISBN: 1111827044. (Optional)<br>-Dalgaard, P. (2008) Introductory Statistics with R. Springer Science and Business Media. ISBN: 978-0-387-79053-4. (Optional) |
| **Method of evaluation** | **25.00**% - Course Project(s)<br>**20.00**% - Problem sets<br>**35.00**% - Midterm exam<br>**20.00**% - Homework /Assignments |
| **Nature of the assignments** | Homework will complement the work in class, generally due every other Wednesday. No late homeworks accepted unless prior arrangements have been made. Staple the pages together (we are not responsible for lost pages). Submit the problems in order, making sure that the computer output and discussion is placed together. Do not put the computer output at the end of home- work; raw output is not acceptable. Make it clear what parts of the output are relevant and show how they answer the questions posed. You are encouraged to work together on the homework, but collaboration with classmates is strictly limited to discussing problems, not writing them up or sharing R code. ? |
| **Course Policies** | Grades will be posted on the course website. Students who miss homeworks or exams should expect a grade of zero on that assignment. Your grade on any homework or exam may be disputed only within 48 hours of receiving the graded exam. If you are unable to take an exam or complete an assign- ment on time due to circumstances beyond your control, please e-mail me within 24 hours for appropriate arrangements. If you know ahead of time that you will have a university excused absence, homework assignments are due before you leave, and exams will be made up after you return. |
| **Additional Information** | The materials used in this course are copyrighted. By materials, I mean all materials generated for this class including syllabi, exams, course notes, computer code, and examples. You do not have the right to copy the handouts or distribute them, unless I expressly grant permission.<br>This syllabus should be taken as a fairly reliable guide for the course content. However, you cannot claim any rights from it and in particular I reserve the right to change due dates or the methods of assessment. Ocial announcements will ALWAYS be those made in class. |

| Tentative Course Schedule<br>*(Time, topic/emphasis & resources)* | | |
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| **Week** | **Lectures** | **Topic** |
| 1 | Sun 01/22/2017<br>Wed 01/25/2017 | Introduction |
| 2 | Sun 01/29/2017<br>Wed 02/01/2017 | R programing |
| 3 | Sun 02/05/2017<br>Wed 02/08/2017 | Data collection |
| 4 | Sun 02/12/2017<br>Wed 02/15/2017 | Descriptive statistics |
| 5 | Sun 02/19/2017<br>Wed 02/22/2017 | Probabiliy theory |
| 6 | Sun 02/26/2017<br>Wed 03/01/2017 | Probability theory |
| 7 | Sun 03/05/2017<br>Wed 03/08/2017 | Sampling distribution |
| 8 | Sun 03/12/2017<br>Wed 03/15/2017 | Sampling distribution |
| 9 | Sun 03/19/2017<br>Wed 03/22/2017 | Estimation |
| 10 | Sun 03/26/2017<br>Wed 03/29/2017 | Estimation |
| 11 | Sun 04/02/2017<br>Wed 04/05/2017 | Confidence interval |
| 12 | Sun 04/09/2017<br>Wed 04/12/2017 | Confidence interval |
| 13 | Sun 04/16/2017<br>Wed 04/19/2017 | Hypothesis test |
| 14 | Sun 04/23/2017<br>Wed 04/26/2017 | Hypothesis test |
| 15 | Sun 04/30/2017<br>Wed 05/03/2017 | Linear regression |
| 16 | Sun 05/07/2017<br>Wed 05/10/2017 | Linear regression |
| 17 | Sun 05/14/2017<br>Wed 05/17/2017 | ANOVA |
| 18 | | ANOVA |

**Note**

The instructor reserves the right to make changes to this syllabus as necessary.