



**Jordan University of Science and Technology**  
**Faculty of Science & Arts**  
**Mathematics Department**

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|----------------------------|
| MATH230 Probability Theory |
| First Semester 2017-2018   |

| <b>Course Catalog</b>   |
|---|
| 3 Credit Hours. Definition and axioms of probability, some probability theorems, conditional probability and independence. Random variables, probability distributions, expectation, some discrete and continuous distributions,. Joint distributions, marginal and conditional distributions, distributions of functions of random variables: the cumulative distribution function method, moment generating function method, Jacobian method, sampling distributions, limiting distributions. |

| <b>Text Book</b>         |   |
|--------------------------|---|
| <b>Title</b>             | Probability and Mathematical Statistics |
| <b>Author(s)</b>         | Prasanna Sahoo                          |
| <b>Edition</b>           | 1st Edition                             |
| <b>Short Name</b>        | 1                                       |
| <b>Other Information</b> | 2013                                    |

**Course References**

| Short name | Book name                                 | Author(s)                                      | Edition     | Other Information |
|------------|---|--|-------------|-------------------|
| 3          | Introduction to Mathematical Statistics   | Hogg, R., Craig, S., and Mckean, J             | 6th Edition |                   |
| 2          | Mathematical Statistics with Applications | Wackerly, D., Mendenhall, W., and Scheaffer, R | 7th Edition |                   |

| <b>Instructor</b> |                   |
|-------------------|-------------------|
| Name              | Dr. Mahmoud Smadi |
| Office Location   | PH2 L1            |

|              |   |
|--------------|---|
| Office Hours | Sun : 12:30 - 14:00<br>Mon : 12:30 - 14:00<br>Tue : 12:30 - 14:00<br>Wed : 12:30 - 14:00<br>Thu : 12:30 - 14:00 |
| Email        | smadi@just.edu.jo   |

| Class Schedule & Room   |
|---|
| Section 1:<br>Lecture Time: Mon, Wed : 10:00 - 11:30<br>Room: M3306 |

| Prerequisites |                               |                      |
|---------------|-------------------------------|----------------------|
| Line Number   | Course Name                   | Prerequisite Type    |
| 902010        | MATH201 Intermediate Analysis | Prerequisite / Study |

| Tentative List of Topics Covered |  |            |
|----------------------------------|--|------------|
| Weeks                            | Topic  | References |
| Week 1                           | Introduction : Combinatorial Methods   |            |
| Week 2                           | Probability: Sample spaces, Events, Rules of Probability   |            |
| Week 3                           | Bayes Theorem. Independent Events.   |            |
| Week 4                           | Probability Distribution and Densities: Discrete and Continuous Random Variables.                                |            |
| Week 5                           | Mathematical Expectation. Expected Value, Moments, Moment Generating Functions.                                  |            |
| Week 6                           | Special Probability Distributions: Discrete Uniform Distribution, Bernoulli Distribution, Binomial Distribution. |            |
| Week 7                           | Geometric distribution. Negative binomial distribution, Hypergeometric and Poisson Distribution.                 |            |
| Week 8                           | Special probability Densities: Uniform Density, Exponential Distributions, and Gamma Distributions.              |            |
| Week 9                           | Beta Distributions, Normal Distributions, and Cauchy distributions.  |            |
| Week 10                          | Joint Distributions. Marginal and Conditional Distributions.   |            |
| Week 11                          | Covariance, Conditional Expectation.   |            |
| Week 12                          | Functions of Random Variables: Distribution Function Technique and Order Statistics.                             |            |
| Week 13                          | Transformation Technique. Moment Generating Function Technique.  |            |

|            |   |  |
|------------|---|--|
| Week<br>14 | Laws of Large Numbers and Central Limit Theorem |  |
|------------|---|--|

| Mapping of Course Objectives to Program Student Outcomes <sup>1</sup>  | Assessment method |
|--|-------------------|
| Define and illustrate basic probability concepts, and rules, conditional probability, and use Bayes' Rule. [1a, 1b]  | FIRST EXAM        |
| Define, illustrate and apply the concepts of discrete and continuous random variables [1a, 1b]   | FIRST EXAM        |
| Define, illustrate and apply certain frequently used discrete and continuous probability distributions. [1a, 1b]   |                   |
| Define, illustrate and apply the concept of the expectation to the mean, variance, moment, and moment generating function.. [1a, 1b]                                   |                   |
| Define, illustrate joint distributions, conditional distributions, and covariance function. [1a, 1b]   |                   |
| Illustrate and apply theorems concerning the distributions of functions of random variables using CDF, transformation, and moment generating function method. [1a, 1b] |                   |
| Illustrate and apply weak law of large numbers and central limit theorem [1a, 1b]  |                   |

| Relationship to Program Student Outcomes (Out of 100%) |    |   |   |   |   |   |   |   |   |   |
|--|----|---|---|---|---|---|---|---|---|---|
| a  | b  | c | d | e | f | g | h | i | j | k |
| 50   | 50 |   |   |   |   |   |   |   |   |   |

| Evaluation      |        |
|-----------------|--------|
| Assessment Tool | Weight |
| FIRST EXAM      | 30%    |

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