

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

| Module Information معلومات المادة الدراسية | | | |
|---|-----------------------------------|-------------------------------|---|
| Module Title | Probability and Statistics | | Module Delivery |
| Module Type | BASIC | | <ul style="list-style-type: none"><input checked="" type="checkbox"/> Theory<input checked="" type="checkbox"/> Lecture<input checked="" type="checkbox"/> Lab<input checked="" type="checkbox"/> Tutorial<input type="checkbox"/> Practical<input type="checkbox"/> Seminar |
| Module Code | | | |
| ECTS Credits | 4 | | |
| SWL (hr/sem) | 60 | | |
| Module Level | | Semester of Delivery | |
| Administering Department | Type Dept. Code | College | Type College Code |
| Module Leader | Name | e-mail | E-mail |
| Module Leader's Acad. Title | Professor | Module Leader's Qualification | Ph.D. |
| Module Tutor | Name (if available) | e-mail | E-mail |
| Peer Reviewer Name | me | e-mail | E-mail |
| Scientific Committee Approval Date | 01/06/2023 | Version Number | 1.0 |

| Relation with other Modules العلاقة مع المواد الدراسية الأخرى | | | |
|--|------|----------|--|
| Prerequisite module | None | Semester | |
| Co-requisites module | None | Semester | |

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

| | |
|--|---|
| <p>Module Aims أهداف المادة الدراسية</p> | <p>This course is designed to provide an introduction to a range of statistical tools of relevance to scientists. Specific topics include an overview of statistical distributions, significance testing, uncertainty determination, linear regression and experimental design. The application of statistics for quality control and practical experience in the application of statistical features in the widely used Minitab and Microsoft Excel is particularly emphasized. The teaching methods used will be a combination of lectures, self-study, labs, tutorials, and any combination of discussion, case study, problem-solving exercises and computer-based learning.</p> |
| <p>Module Learning Outcomes مخرجات التعلم للمادة الدراسية</p> | <ol style="list-style-type: none"> 1. Describe basic statistical terms which are of relevance to the area of analytical science. 2. Graphically display and numerically summarise data using appropriate tables, graphs and measures of centre, spread and position. 3. Explain and apply concepts of basic probability including, conditional probability, Bayes' theorem, independent events and counting formulae. 4. Make inferences about population parameters using sample statistics using confidence interval estimates and tests of statistical hypotheses. 5. Describe the application of statistics to sampling, quality control, analytical method validation and experimental design. 6. Use an appropriate method for analysing relationships between variables in a dataset |
| <p>Indicative Contents المحتويات الإرشادية</p> | <ol style="list-style-type: none"> 1. Describe basic statistical terms which are of relevance to the area of analytical science <ul style="list-style-type: none"> • Introduction to Statistical Terms • Populations and Samples • Data Types • Introduction to Sampling Methods 2. Graphically display and numerically summarise data using appropriate tables, graphs and measures of centre, spread and position. <ul style="list-style-type: none"> • Graphical Representation of data including frequency tables and charts • Measures of Central Tendency, Position and Dispersion. 3. Explain and apply concepts of basic probability including, conditional probability, Bayes' theorem, independent events and counting formulae; <ul style="list-style-type: none"> • Probability Experiments • Probability Trees • Classical Probability • Experimental Probability • Addition and Multiplication Rules of Probability • Counting Rules • Bayes Theorem |

| | |
|--|---|
| | <ul style="list-style-type: none"> • Discrete Probability Distributions • Binomial Distribution • Poisson Distribution • The Normal Distribution • Applications of the standard Normal Distribution • Assessing Normality • The Central Limit Theorem <p>4. Make inferences about population parameters using sample statistics using confidence interval estimates and tests of statistical hypotheses</p> <ul style="list-style-type: none"> • Introduction to Hypothesis Testing • Writing hypotheses for statistical tests • One Sample, Independent Samples and Paired Samples t-tests • z-tests for proportion size <p>6. Use an appropriate method for analysing relationships between variables in a dataset</p> <ul style="list-style-type: none"> • Relationship Modelling • Pearson's Correlation Co-efficient • Significance of the correlation co-efficient • Simple Linear Regression • Chi Square test for association • Chi Square test of goodness of fit <p>During the Practical element of the course, students will use the Data Analysis ToolPak in Microsoft Excel and also Minitab to carry out the various types of analysis listed in the syllabus above.</p> |
|--|---|

| Learning and Teaching Strategies استراتيجيات التعلم والتعليم | |
|--|---|
| Strategies | <p>The teaching methods used will be a combination of online-lectures, self-study, online practical workshops, and any combination of discussion, case study, problem-solving exercises and computer-based learning.</p> <p>The practical element of the course will be delivered separately to students in their various class groups (Biomedical Science/Medical Biotechnology, Forensic Science, Pharmaceutical Science) so that the examples used in the practical application of statistics can be tailored to their field of study.</p> |

| Student Workload (SWL) الحمل الدراسي للطلاب | | | |
|--|----|---|-------|
| Structured SWL (h/sem) الحمل الدراسي المنتظم للطلاب خلال الفصل | 40 | Structured SWL (h/w) الحمل الدراسي المنتظم للطلاب أسبوعيا | 2.666 |
| Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطلاب خلال الفصل | 20 | Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطلاب أسبوعيا | 1.333 |

| | |
|--|----|
| Total SWL (h/sem) الحمل الدراسي الكلي للطلاب خلال الفصل | 60 |
|--|----|

| Module Evaluation تقييم المادة الدراسية | | | | | |
|--|-----------------|-------------|------------------|------------|---------------------------|
| | | Time/Number | Weight (Marks) | Week Due | Relevant Learning Outcome |
| Formative assessment | Quizzes | 2 | 10% (10) | 5, 10 | LO #1, 2, and 3 |
| | Assignments | 2 | 10% (10) | 7, 12 | LO # 4 and 6 |
| | Projects / Lab. | 1 | 10% (10) | continuous | |
| | Report | 1 | 10% (10) | 14 | LO # 5 and 7 |
| Summative assessment | Midterm Exam | 2 hr | 10% (10) | 8 | LO # 1-5 |
| | Final Exam | 3hr | 50% (50) | 16 | All |
| Total assessment | | | 100% (100 Marks) | | |

| Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري | |
|--|--|
| | Material Covered |
| Week 1 | <ul style="list-style-type: none"> Introduction to Statistical Terms Populations and Samples |
| Week 2 | <ul style="list-style-type: none"> Data Types Introduction to Sampling Methods |
| Week 3 | <ul style="list-style-type: none"> Graphical Representation of data including frequency tables and charts Measures of Central Tendency, Position and Dispersion. |
| Week 4 | <ul style="list-style-type: none"> Probability Experiments Probability Trees |
| Week 5 | <ul style="list-style-type: none"> Classical Probability Experimental Probability |
| Week 6 | <ul style="list-style-type: none"> Addition and Multiplication Rules of Probability Counting Rules |
| Week 7 | <ul style="list-style-type: none"> Bayes Theorem Discrete Probability Distributions |
| Week 8 | <ul style="list-style-type: none"> Binomial Distribution Poisson Distribution |
| Week 9 | <ul style="list-style-type: none"> The Normal Distribution Applications of the standard Normal Distribution |

| | |
|----------------|---|
| Week 10 | <ul style="list-style-type: none"> Assessing Normality The Central Limit Theorem |
| Week 11 | <ul style="list-style-type: none"> Introduction to Hypothesis Testing Writing hypotheses for statistical tests |
| Week 12 | <ul style="list-style-type: none"> One Sample, Independent Samples and Paired Samples t-tests z-tests for proportion size |
| Week 13 | <ul style="list-style-type: none"> Relationship Modelling Pearson's Correlation Co-efficient |
| Week 14 | <ul style="list-style-type: none"> Significance of the correlation co-efficient Simple Linear Regression |
| Week 15 | <ul style="list-style-type: none"> Chi Square test for association Chi Square test of goodness of fit |
| Week 16 | Preparatory week before the final Exam |

| Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر | |
|---|-------------------------|
| | Material Covered |
| Week 1 | Lab 1: |
| Week 2 | Lab 2: |
| Week 3 | Lab 3: |
| Week 4 | Lab 4: |
| Week 5 | Lab 5: |
| Week 6 | Lab 6: |
| Week 7 | Lab 7: |

| Learning and Teaching Resources مصادر التعلم والتدريس | | |
|---|--|----------------------------------|
| | Text | Available in the Library? |
| Required Texts | Practical Statistics for the Analytical Scientist | Yes |
| Recommended Texts | Essential Mathematics and Statistics for Science | No |
| Websites | www.mathhandbook.com | |

Grading Scheme

مخطط الدرجات

| Group | Grade | التقدير | Marks (%) | Definition |
|-------------------------------------|------------------|---------------------|-----------|---------------------------------------|
| Success Group (50 - 100) | A - Excellent | امتياز | 90 - 100 | Outstanding Performance |
| | B - Very Good | جيد جدا | 80 - 89 | Above average with some errors |
| | C - Good | جيد | 70 - 79 | Sound work with notable errors |
| | D - Satisfactory | متوسط | 60 - 69 | Fair but with major shortcomings |
| | E - Sufficient | مقبول | 50 - 59 | Work meets minimum criteria |
| Fail Group (0 – 49) | FX – Fail | راسب (قيد المعالجة) | (45-49) | More work required but credit awarded |
| | F – Fail | راسب | (0-44) | Considerable amount of work required |

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54). The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.