**Statistics Assessment Guidelines**

This document details what is required for the formal assessment of the course.

**Assessment materials**

For the assessment you will be provided with a new, unique ammonite quadrat from a bed (labelled “Upper Bed”) that is geologically younger than that of your “training” quadrat (labelled “Lower Bed”). Your assessment should focus on this Upper Bed quadrat, but it is recommended that you make reference to your Lower Bed quadrat results for context. The geologic setting for this data was given (briefly) in Lecture 2. You can also make the following assumptions for this assessment: 1. All ammonites from both beds belong to the same species and there is no sexual dimorphism (males and females are the same shape and size), 2. All ammonites are completely preserved (i.e., the ammonites are accurately represented and not missing broken off parts nor is anything partially obscured by sediment), and 3. There has been no deformation of the fossils post-deposition. (NB: When encountering fossils for real in the field these are all factors you should consider, but here we will simplify things.)

**Measurements**

Unlike for the Lower Bed you are given the measurements needed for the assessment (see the reverse of your assessment quadrat) and you should NOT measure the data yourself.

**Form of assessment**

The assessment should be in the form of a 1200-word report using the typical structure of a scientific paper (albeit without the requirement of references, see below). A rough guide for this format follows with sections (in the order expected in the final report) in italics and corresponding details below.

*Title*

This should tell the reader important information on the subject (What? How? Where? When?) and not simply be something like “Statistics report”.

*Name*

Your name will suffice, but for a real scientific paper this would also include the address of your institution and typically an email address.

*Abstract*

A very concise summary of your entire report. Probably only 2-4 sentences are required here. It is recommended that you write this last.

*Introduction*

Here you should introduce the topic, first at a broad level and then in more detail. Ideally you will also pose some questions here that you will return to later in the discussion section.

*Materials and Methods*

Here you will describe your data and methods. For the former this should include basic information on what the data are, how they are measured, level of precision etc. For the latter you should state what statistical test(s) you used, define null and alternative hypotheses for each of them (including how you will make further determinations if rejecting the null means multiple alternative possibilities), state the alpha-level you will use and ideally match each test to a question posed in your introduction.

*Results*

Here you will briefly summarise the results of all of your tests. You may also wish to make reference to tables and figures (see below) that summarise the results. State whether or not you rejected the null and if so what the alternative represents. Do not perform interpretation here as this belongs in the discussion section.

*Discussion*

This should probably be the longest section as it is where you will consider what your results tell you about both your ammonites and the Jurassic environment in which they were preserved. This is your opportunity to show you are able to apply Lesson #2 and think more deeply about your data. You should return to your questions here and consider whether or not you have (or can) answer them. It is also fruitful here to consider the limitations of your knowledge from the data and any of the tests performed. Reference to the Lower Bed results are also helpful here.

*Conclusions*

A brief summary of your overall findings. Note this is different to the abstract which summarises the whole report.

*References*

These are not required, but if you do wish to include any they should go here.

*Table(s)*

Any table(s) of data or test results should appear here. Note that in all cases table(s) like figures must: 1. Be numbered (from 1 to N), 2. Have captions explaining them, and 3. Be cited (i.e., referred to) in the main text. (Consult the primary literature for examples of this.) Columns and rows should have headings/names although these can be abbreviated and explained in longer form in the caption. Note that table(s) are *not essential* here so it is up to you to decide if they are the best way to present your work. Tables also count towards the word limit.

*Figures*

These are your opportunity to apply Lesson #1, but also key ways to summarise your data visually. Remember the old adage that a picture is worth a thousand words. These should be produced in R using the appropriate functions and are best exported as PDFs. Note that like tables these must: 1. Be numbered (1 to N), 2. Have captions informing the reader of their contents, and 3. Be cited (referred to) in the text. Figures should also always have labelled axes.

**R scripts**

An R script is provided (in addition to the code found on the back of your quadrat) to help you perform your analyses, but you will be expected to modify this yourself. This does not form part of the assessment, however, so do not include it in your report.

**Which tests to perform**

Over the lectures and practicals you will perform multiple analyses on your test (Lower Bed) quadrat. However, here it is up to you to decide which tests are appropriate to answer your questions (NB: many may not be, and indeed even tests appropriate to the Lower Bed data may not be appropriate to the Upper Bed data). However, a recommended course of action is to repeat all of those done for the Lower Bed initially, then cull down for the report. The collective implications of the Lower Bed tests are discussed in Lecture 8, and this should also help guide you. You may also wish to perform additional tests. Note that generally there should be a clear motivation for each test and ultimately a consideration of what it tells us about the ammonites and their environment of deposition.

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| **MARK** | **COMMENT** | **ABSTRACT & INTRO** | **MATERIALS & METHODS** | **RESULTS** | **DISCUSSION & CONCLUSIONS** |
| 80 – 100 | An outstanding report. A whole class above a normal first. | Concise and well written. No errors or omissions. | Concise and accurate description. No detectable errors. | Presentation, description and analysis of results are of a very high standard. | Outstanding depth and breadth. Explains complex ideas and relates them to current work. Suggestions for novel and valid extensions. |
| 70 – 79 | Excellent presentation with good command of English, IT skills and appropriate statistics. No significant errors or omissions. | Abstract gives aim, key findings (qualitative & quantitative) and conclusions in clear coherent manner, supported by evidence. Introduction covers all major areas of background, is well written & with definitive aim. | Complete, accurate and logical description of methodology and data, with no trivial details. Clear outline of appropriate numeric and statistical methods, where appropriate. | Precise description and presentation of results. Figures & tables are correct, with concise legends & complementary text. Accurate use of the analytical methods. | Clear, coherent discussion. Able to discuss the significance of results and provide a sound critique. Good ideas for development of work. |
| 60 – 69 | Good all-round account. Sufficient work to indicate the candidate has a sound knowledge and understanding of the project. Few errors/omissions. | Abstract states aim, important findings and conclusions. Sufficient information specific to the study and its findings is given. Introduction is logical with a good description of literature and clear aim. | Accurate description of full methodology and data. Few minor omissions and/or trivial detail. Appropriate choice of numeric and statistical methods, where appropriate. | Sound description & presentation of results. Figures & tables largely correct. Appropriate use of analytical methods. | Good coherence, appreciates the significance of results, moderate critical analysis. Clear awareness of study limitations. Some ideas for development of work. |
| 50 – 59 | Clear evidence the candidate has a reasonable knowledge and understanding of the project. May contain some errors or omissions. | Sound abstract but may lack some specific information on the study and findings. Introduction gives an adequate description of background and statement of aim. | Competent description of key aspects of the methodology and data. Some errors and omissions, or inclusion of trivial details. A superficial description of numeric or statistical methods, where appropriate. | Mostly clear and accurate description and presentation of results. Some errors in figures and tables and/or application of analytical methods or limited use of the latter. | Coherent and competent assessment of results with some critical analysis. May be some repetition of results and few clear ideas for development of work. |
| 41 - 49 | Sufficient work to indicate the candidate has the minimum acceptable knowledge and understanding of the project. May exhibit poor editing. | May lack clarity and coherence. Abstract may contain little specific information on the study and its conclusions may not be supported by findings. Introduction contains a weak literature review and/or poor statement of aim. | Weak description of methodology and data. Poor logic, significant omissions, or much trivial detail. Little description of numeric or statistical methods, where appropriate. | Superficial or inaccurate description & presentation of results. Figures & tables contain frequent errors. Limited links between figures/tables & text, may also be duplication. Poor use of analytical methods. | Much repetition of results with little assessment of them. Few or no ideas for development of work. Little critical analysis. |
| Pass | Sufficient work to reach minimum acceptable standard |  |  |  |  |
| Fail (20– 39) | Poor report. Clear evidence of a lack of understanding of background and/or application. Significant errors and omissions. | Poor clarity and coherence. Significant omissions from abstract or introduction. Introduction is a superficial review of literature with vague or no statement of aim. | Superficial description or many mistakes. Difficult to understand how results have been obtained and analysed. Unsafe practice. | Incomplete and/or inaccurate description and presentation of results. Figures and tables absent, incorrect or not linked to text. Little use of analytical methods. | Much repetition of results with little assessment of them. Few or no ideas for development of work. No critical analysis and many errors in text.. |
| Bad fail  (0 – 19) | Inadequate write-up. Much evidence of a lack of understanding of background and/or application. Many errors and omissions. | Rudimentary attempt. May be no abstract and/or little evidence in the Introduction of with data. No aim. Badly written. | Unable to repeat work from the information given. Methodology and/or analysis of the results are incomprehensible. Unsafe practice. | Poor description and presentation of results. Figures and tables absent or totally inadequate. Figures may be present with no text. No significant use of analytical methods. | No serious attempt to discuss the significance of the results. |