Course Requirements and Timetable for

Biochemistry 4B06

Course Instructors:

Felicia Vulcu – Biochemistry 4B06
email: vulcuf@mcmaster.ca, office location: HSC-1H3, extension: 22495.

Tony Collins – Biochemistry 4F09
email: tcollins@macbiophotonics.ca, office location: HSC-4H20, extension: 28812.

- All assignments and final write-ups are to be handed in during the designated due date no later than 4:00pm in the Biochemistry drop boxes (black cabinet by HSC-4H39)

Please check the Biochemistry 4B06/ 4F09 folders on WebCT for important information and day-to-day updates and all relevant course material.

Welcome to Biochemistry 4B06/4F09. The overall goal of this course is to introduce you to the rich scientific culture in the McMaster University Department of Biochemistry and Biomedical Sciences. Here you will develop numerous laboratory skills while being exposed to cutting-edge innovative research. You will also attend a series of tutorials designed to develop your written and communication skills. There will be 3 assignments to be completed throughout the year. Additionally, 4B06 students are to design and present a poster highlighting their work at the end of the year and 4F09 students are to prepare 2 presentations designed to highlight their work. All students are to submit a write-up of their work at the end of the year in the format of a scientific journal article. The best journal article will then be selected in our “best undergraduate paper” competition and the winner will be presented with a prize and have their abstract published in the McMaster Biochemistry Newsletter. Good luck and have fun😊

Teaching Assistants:

Casey Fowler: fowlercc@mcmaster.ca

Maria Kondratyev: mashlo88@gmail.com
## Evaluation breakdown:

<table>
<thead>
<tr>
<th>Assessment tool</th>
<th>Biochemistry 4B06</th>
<th>Biochemistry 4F09</th>
<th>% of final mark</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assignment # 1</td>
<td>✔</td>
<td>✔</td>
<td>2.5</td>
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<tr>
<td>Assignment # 2</td>
<td>✔</td>
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<td>5</td>
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<tr>
<td>Assignment # 3</td>
<td>✔</td>
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<td>2.5</td>
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<tr>
<td>Poster Presentation</td>
<td>✔</td>
<td>✗</td>
<td>25</td>
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<tr>
<td>Verbal Presentations</td>
<td>✗</td>
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<td></td>
<td></td>
<td>2 presentations</td>
<td>Presentation 1 = 10%</td>
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<td>Presentation 2 = 15%</td>
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<tr>
<td>Laboratory work</td>
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<td>✔</td>
<td>40</td>
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<tr>
<td>Thesis (in the form of a Journal Article)</td>
<td>✔</td>
<td>✔</td>
<td>25</td>
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**Relevant Material:** Course outline, McMaster University Undergraduate Innovation Journal Manuscript Guidelines, Assignment Portfolio, Poster Presentation Guidelines (4B06) and Presentation Guidelines (4F09)., Writing Styles Guidelines.

**Suggested book:** From Research To Manuscript: A Guide to Scientific Writing by Michael Jay Kats. The book is currently available on reserve (e-resource) at Thode Library. Please focus on Chapters 2 (The Scientific Paper) and 3 (Tools and Techniques). All this material is found on WebCT.

**Schedule of Events:**

**Initial meeting (3rd week of September)** – the student should arrange a meeting with his/her supervisor to discuss the research project, course requirements, work schedule and expectations of supervisor. The student and supervisor must agree on all these terms and then fill out the Initial Meeting form provided which summarizes the main outcomes of the meeting. This should be handed in to the Biochemistry drop boxes (black cabinet besides HSc-4H39) no later than September 26. Laboratory work should begin following this meeting.

**Tutorial** - please note that the tutorial hours are not included in the number of hours each student must spend in the lab.

5 tutorials/ year designed to build your technical writing skills and help you successfully
Tutorial 1 (Monday September 15th HSC-1A3, 12:30-1:30pm) – “The Meet and Greet”. This tutorial is designed to bring all 4B06 and 4F09 students together to help develop an interactive support network throughout the year. This network will be the “helpline” for students when they face problems with their experiments. The network will include the course instructors and teaching assistants. This tutorial will also be used to schedule the subsequent 4 tutorials throughout the year. If you cannot attend this tutorial DO NOT PANICK. Simply email Felicia Vulcu and we’ll set up a meeting.

Tutorial 2 – This tutorial is designed to give you a working knowledge of the free OpenOffice software that you will be using to design figures, presentations, etc. The OpenOffice software can be run from your memory stick and can be downloaded from the link provided on WebCT. The tutorial will also focus on providing students the skills necessary to write a successful Introduction.

Tutorial 3 – This tutorial is designed to give you the proper skills to formulate your data into figures designed for journal articles, poster presentations or oral presentations.

Tutorial 4 – This tutorial is designed to give students an indepth understanding of writing a results and discussion section.

Tutorial 5 – The Mini-Poster/Presentation session. This tutorial is designed to allow students an opportunity to present their oral/poster presentations in front of a small group of their peers.

There are 3 Assignments that must be completed and handed in by all 4B06/4F09 students. The assignments are designed to guide you through the final thesis (in the form of a journal article) writing process.

Assignment # 1 (2.5%) – Introduction. Due Date: October 15th, 2008

Students are required to provide a condensed introduction/review of their research field with particular emphasis on their thesis project. This should include a statement of the proposed research and its possible impact on the field as a whole. The introduction should be no more than 2 pages double-spaced and should include at least 1 diagram (not included in the 2 page limit) that best depicts the project they are working on. Proper references (JBC style) should be included where appropriate. Students must create the diagram highlighting their project in the context of the field as a whole using Microsoft PowerPoint.

Assignment # 2 (5%) – Figures/ Figure Captions and Techniques. Due Date: January 19th, 2009.

Students are required to provide 2 Figures complete with labels, headings and a figure caption written in 3 formats: 1) poster, 2) PowerPoint presentation and 3) journal article. This should be clear and concise.

Students are to also provide a detailed discussion (maximum 3 double-spaced pages) of the techniques used in the figures. This includes an in-depth knowledge of each technique (use diagrams if necessary) complete with limitations, problems they encountered, troubleshooting, alternative techniques, etc. (A step-by-step lab protocol with no additional explanations is NOT acceptable).

Assignment # 3 (2.5%) – Results and Discussion Due Date: February 23rd, 2009.

Students are required to utilize the figures from assignment 2 and describe their significance in a separate results and discussion section.
**4F09 presentation dates November 19-21, march 24-26.** First presentation is worth 10%, the second presentation is worth 25%. Please read the “Oral Presentation Guidelines for Biochemistry 4F09” for details.

**4B06 poster presentation dates march 31, worth 25% of the mark.** Please read the “Poster Presentation Requirements for Biochemistry 4B06” for details.

**Submission of final journal article – April 7, 2009 (worth 25%).** Submit one copy of your final journal article directly to your supervisor and submit 3 copies to Mary Margaret Strong in HSC 4N45. Late submissions will be penalized with a deduction of 2% per day from the final mark.

**Evaluation of Laboratory Performance – April 7, 2009 (worth 40%).** At the end of the term the supervisor will fill out and submit a final “Evaluation of Laboratory Performance” form (attached) to Mary Margaret Strong. Supervisors will evaluate their students based on:

1. Laboratory Work
   - Ability to plan and execute experiments in an efficient and organized way
   - Skill in laboratory techniques
   - Ability to interpret data; not to overlook any conclusions nor to draw unfounded conclusions

2. Responsibility and commitment to project
   - Demonstration of originality and independence of thought

3. Understanding of the research problem and how it fits in with existing knowledge and future studies

Supervisors are requested to provide justification for the grade assigned with specific comments and examples.

**Lab notebook guidelines** - A notebook is an essential tool to help organize your laboratory research. Number each page of the notebook, date and record each experiment, including the experimental procedure, results and analysis with calculations. The content of the notebook should be easily readable and should contain enough information so that another undergraduate student could repeat the experiment with no prior knowledge. Care should be taken to ensure the notebook is very organized and contains an index for ease of navigation. Make sure to include all details of day-to-day experiments including a purpose for the experiment, any mistakes made throughout the experiment and the conclusions. Include all discussions and thoughts on the experimental goals (this includes email communications between your supervisor/collaborator(s)). This notebook is an integral part of your supervisor’s research and must be left with the supervisor at the conclusion of the project. Please check the WebCT course folder and read Chapters 2 and 3 of the “From Research to Manuscript: A Guide to Scientific Writing” for guidelines on how to keep a lab notebook.

To assist with your review of the literature, students will find PubMed to be an excellent research tool. PubMed is a service of the National Library of Medicine which searches the MEDLINE database covering the fields of medicine, nursing, dentistry, veterinary medicine, the health care system, and the preclinical sciences. MEDLINE contains bibliographic citations and author abstracts from more than 4,600 biomedical journals published around the world dating back to 1966. PubMed includes links to many sites providing full text articles online and other related resources.

Please follow this link to visit the animated tutorials on how to use PubMed: http://www.nlm.nih.gov/bsd/disted/pubmed.html#qt
Remember when searching databases, that your choice of key words is important in getting the best search results possible.
The majority of the journals related to research in Biochemistry are located in the Health Sciences Library. Many of these journals can be accessed online through PubMed and also through the library’s subscription to online resources http://library.mcmaster.ca/search/

**Completion of Lab Work** - Students enrolled in 4B06 and 4F09 should aim to have their laboratory experiments completed by the end of Reading Week in February (16-21, 2009), to allow sufficient time for data analysis, preparing your presentation and writing your thesis (journal manuscript format).

**Safety training** – Please ensure that students have taken the core/update WHMIS, Fire Training, Biosafety and all other relevant safety courses prior to starting in the lab.

**ACADEMIC DISHONESTY**: Please refer to the [Statement on academic ethics](http://library.mcmaster.ca/search/) and the [Senate resolutions on academic dishonesty](http://library.mcmaster.ca/search/) found in the Senate policy statements as distributed by the Senate office. Plagiarism of your classmate's work (be it from this year or previous years), or any text from books, the web, tests or papers, is unacceptable conduct and is subject to penalty if observed by the course professor or assistants.
# Evaluation of Laboratory Performance

For Biochemistry 4B06 and 4F09

**Student Name (please print):** ___________________________________________

**Committee Member:** ________________________________________________

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<th>Top 30%</th>
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<th>Below 50%</th>
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<td>9. Experimental judgment</td>
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**Overall ability (numerical score out of 100)**

**Additional comments and justification for the assigned mark:**

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Initial Meeting (3rd week of September) Form

Please take the time with your student to summarize the outcome of the following discussion topics. Please hand in this sheet to Mary Margaret (office).

**Research Project** (a quick summary of the main goal(s) of the project):

**Course Requirements** (clearly write out all the course components that need to be achieved by the student and the supervisor):

**Work Schedule** (a statement showing that the student understands the main concept of the research project and feels confident that the time allotted is sufficient to achieve the goal):

**Expectations of supervisor**:

**Expectations of student**:

**Summary of summer work (applicable only if student has previously worked in the same laboratory)**:

Signature of student _____________________          Signature of supervisor____________________
Evaluation of Thesis (Journal Article)

For Biochemistry 4B06 and 4F09

The journal article should be evaluated based on the following criteria:

1. Understanding of the problem and relevant background information.
2. Results obtained and their interpretation/analysis.
3. In cases where significant problems were encountered, how they were approached and resolved.
4. Clarity of presentation based on the journal article guidelines provided, literature, citation, etc.

The journal article is worth 25 marks. Based on the above criteria, please assign a mark out of 25 giving appropriate justification.

Student Name: ____________________________________________________________

Committee Member: ________________________________________________________

Final Mark (/25): ____________________________

Comments:

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McMaster University
Undergraduate Innovation Journal

Guidelines for submission of thesis in the form of a journal article (Biochemistry 4B06 and 4F09 students)

Course Instructors:

Tony Collins – Biochem 4F09
Felicia Vulcu - Biochem 4B06

Introduction:

The McMaster University Department of Biochemistry and Biomedical Sciences is dedicated to showcasing the monumental achievements of the undergraduate project students currently undergoing research projects in the department. The McMaster University Undergraduate Innovation Journal is currently accepting manuscripts from all Biochemistry 4B06 and 4F09 students. Below is a detailed description of the submission guidelines which must be followed by each student.

All manuscript submissions must be handed in by the specified due date (April 7, 2009) in the designated 4B06/ 4F09 drop boxes (black cabinet beside HSC-4H39).

Formatting Guidelines:

Manuscript must be formatted for 8.5 x 11 inch paper. Text must be formatted as Times New Roman font size 11 with single spacing throughout. Text must be presented in a two-column page format with 0.25 inch spacing between columns (go to: page layout; columns). This includes all sections from Abstract to Discussion but excludes Figure Captions to Supplemental Data. All pages must be numbered (bottom, centre, (1, 2, etc.). The outline of the manuscript should follow this order: Title, Author(s) (your name first, your supervisor’s name last and name of all other contributing members in between) and name of institution

Abstract

Introduction
Materials and Methods
Results
Discussion
References
Abbreviations
Figure Captions
Tables
Figures
Supplemental data (If applicable. This includes the following sections: Materials and Methods (if not discussed above), Figure Captions and Figures).

Title: should be short and straight to the point (no more than 2 printed lines)

Abstract: should be clear and concise in its summary of your main finding(s). Should not exceed 300 words.

Introduction: should clearly place your findings in the context of the field as a whole. This section should not be used as a long summary of the field. The introduction should not exceed one page (using this format). Diagrams explaining your point are highly recommended (they must be original creations NOT copied from other sources!)

Materials and Methods: should be concise and easy to follow so that your experiments could be repeated by another student. The experiments must be clearly laid out and must spell out all buffers used (including concentrations), all equipment used, centrifuge rotors used, speeds of centrifuges, method of lysing cells, etc. When constructing clones ALL primers used must be written out. Referencing techniques is allowed but all experiments performed by you must be laid out step by step. It is not acceptable to state “ western blotting was performed as previously described (ref)”.

Results: This section should describe the data presented in your figures. Care must be taken not to over-analyze or discuss the data in this section.

Discussion: This section is designed entirely for interpreting the data. You can include future experiments that need to be done, other controls that should be performed and even your opinion on what the data might mean to the field as a whole. You can even use a diagram to make your point clear Care should be taken not to over-analyze your data. You should present your ideas in a clear, thought-out manner that should not exceed two typed pages.
**References**: should be cited throughout the text by number, example (1). The references should follow the JBC (Journal of Biological Chemistry) format.

**Abbreviations**: All abbreviations used in the text should be written out in long form the first time they are introduced, example PCR (polymerase chain reaction). This section should contain all abbreviations used along with their long form.

**Tables**: Should contain a title and a short description of the table.

**Figures/ Figure Captions**: should have titles and figure legends describing the experiment in sufficient detail to allow readers to understand the figure in the absence of additional text. The figure legend should include scale bar information for images and details of data points (e.g. mean ± sem). All figures should be high quality and should be created with applications capable of producing high resolution files (TIFF files). These applications include Adobe Illustrator, CorelDRAW or OpenOffice Draw (free). This does NOT include PowerPoint or Word! To learn how to convert images from PowerPoint to another application please follow the link provided: https://rapidsubmission.cadmus.com/jbc/JBC%20PowerPoint%20Update.pdf

For graphic images and other image specifications we have adopted the policy outlined by Journal of Cell Biology.

**Copied from JCB instructions to authors** (http://www.jcb.org/misc/ifora.shtml):

**Image acquisition and manipulation.** The following information must be provided about the acquisition and processing of images:

1. Make and model of microscope
2. Type, magnification, and numerical aperture of the objective lenses
3. Temperature
4. Imaging medium
5. Fluorochromes
6. Camera make and model
7. Acquisition software
8. Any subsequent software used for image processing, with details about types of operations involved (e.g., type of deconvolution, 3D reconstructions, surface or volume rendering, gamma adjustments, etc.).

No specific feature within an image may be enhanced, obscured, moved, removed, or introduced. The grouping of images from different parts of the same gel, or from different gels, fields, or exposures must be made explicit by the arrangement of the figure (i.e., using dividing lines) and in the text of the figure legend. If dividing lines are not included, they will be added by our production department, and this may result in production delays. Adjustments of brightness, contrast, or color balance are acceptable if they are applied to the whole image and as long as they do not obscure, eliminate, or misrepresent any information present in the original, including backgrounds. Without any background information, it is not possible to see exactly how much of the original gel is actually shown. Non-linear adjustments (e.g., changes to gamma settings) must be disclosed in the figure legend. All digital images in manuscripts accepted for publication will be scrutinized by our production department for any indication of improper manipulation. Questions raised by the production department will be referred to the Editors, who will request the original data from the authors for comparison to the prepared figures. If the original data cannot be produced, the acceptance of the manuscript may be revoked. Cases of deliberate misrepresentation of data will result in revocation of acceptance, and will be reported to the corresponding author's home institution or funding agency.

**Numerical data.** Error bars on graphic representations of numerical data must be clearly described in the figure legend. The number of independent data points (N) represented in a graph must be indicated in the legend. Numerical axes on graphs should go to zero, except for log axes. Statistical analyses should be done on all available data and not just on data from a "representative experiment". Statistics and error bars should only be shown for independent experiments and not for replicates within a single experiment.

**Supplemental Data**: should follow the guidelines described above but should be included at the end of the manuscript. If new techniques are involved they must be described in a short supplemental materials and methods section. This should be followed by supplemental figure captions and the supplemental figures.
Writing Styles (requirements for a comprehensive journal article)

The following is a compilation of excerpts obtained from the following website:
http://grcpublication.grc.nasa.gov/editing/chp2.CFM
Please visit the website for more details.

Before you start writing your journal articles print out all your relevant data figures and tables and take a moment to arrange them in the order you feel conveys the most logical story. This story should be clear and concise with a set objective that is laid out in a continuous manner – this will probably not be the order in which you performed the experiments. Below is an excerpt from the website mentioned above that describes the meaning of clarity, conciseness, continuity and objectivity:

Clarity

The purpose of a technical report is to transmit conclusions and their supporting evidence. To do this, your report must convey your exact meaning to the reader. The text must be clear and unambiguous, mathematical symbols must be fully defined, and the figures and tables must be easily understood.

Clarity must be met from the readers' point of view. What may be clear to you as the author may not be clear to your readers. Remember, you are intimately familiar with the work, but they are not. You must continually reexamine your rough drafts with a reader's critical eye. Readers will not tolerate confusion. They must never become uncertain about what you are discussing, why you are discussing it, or what your plan of presentation is. They will rebel if forced into these mental gymnastics. If there is any discontinuity without proper explanation, the average reader will lay aside the report for later reading. Once this happens, the chances are slight that it will ever be read. You usually have just one chance to sell the reader on the report's objectives. And that requires a presentation that is logical, simple, and systematic.

Conciseness

Most of your intended readers are busy. Therefore your reports should be concisely written. That is, your story should be told with the fewest possible words and illustrations. Help your readers by omitting everything irrelevant to the results and conclusions. Do not be disappointed if a report that describes a lengthy program is only a few pages long; Report quality is often inversely related to report length. Your readers will be interested in your conclusions and the supporting evidence and will want to get these as quickly as possible. They will not be particularly interested in any problems you had in getting the results. Explaining such problems usually just hides the important aspects of the report.

On the other hand, do not condense reports at the expense of your readers' understanding. Give enough information to enable them to understand clearly what you are describing and why you are describing it. Include enough background information to make the context clear. Do not assume
that they will remember details of a previous report—or have even read it. Include all details needed to understand the current report. In short, make your reports brief but comprehensible.

**Continuity**

Reports should tell a complete story as logically and interestingly as possible. This requires continuity between succeeding sentences, paragraphs, and sections and between the written text and the figures and tables. Transitional words, phrases, sentences, or even paragraphs may be needed to lead your readers through the story. But overusing transitions can slow the pace of your narrative.

Carefully choose the places at which you refer to figures and tables to limit distraction. Making these references at the beginning or end of a discussion is usually preferable.

**Objectivity**

Technical reports should be objective and show restraint. Be honest with your readers. They will become suspicious if they detect hidden meanings or any type of subterfuge, and you will then have little chance of convincing them of your conclusions. They expect you to evaluate the data honestly. Do not try to hide deficiencies in your research. No technical report is better than the research on which it is based. Tell your readers frankly what your assumptions were, what your probable errors are, and what you may not understand about the results.

In addition to being honest, be tactful. If you are faced with the problem of presenting technical results that may conflict with previous results or with the personal prejudices of some readers, refrain from making dogmatic statements and avoid sounding egotistical. Your readers will be persuaded by facts, but they may become irritated if you attempt to impress them with your cleverness or to claim credit for accomplishments. Write to express, not to impress.

Additional information on writing style can be found at the following website:

http://abacus.bates.edu/~ganderso/biology/resources/writing/HTWtoc.html
Poster Presentation Requirements for Biochemistry 4B06

Poster Presentation (March 31, 2009; worth 25%; location: Ewart Angus Centre) – The poster presentation should describe the research project, the results obtained and their significance. Each poster will be evaluated by two members of the evaluation committee which will NOT include the student’s supervisor. The members of the evaluation committee are asked to fill out and submit a “Poster Evaluation” form to Mary Margaret Strong within 2 days of the presentations. Students will be asked to present their poster to the members of the evaluation committee and answer any questions regarding their research. Any work done during summer months or prior to the beginning of the project should not be included in the presentation without being clearly identified and acknowledged.

Students will be evaluated based on their:

- Poster presentation
- Understanding of the background
- Ability to answer questions
- Knowledge of the experimental approach
- Ability to analyze results
- Progress

The size of the poster display should be restricted to 46 inches wide x 73 inches tall. Each poster should contain the following information:

1. Title (1-2 lines) – describing the objective of the research work (keep it clear, concise and straight to the point)
2. Abstract (300 words) – clearly define the goal of the project and summarize the findings in the context of the field.
3. Introduction/Background (1 page, use a diagram to describe your project as relating to the field if possible) – summarize the field and how your part relates to it. (do not go into details not pertinent to your goal).
4. Results – obtained thus far (or methodology developed) and their interpretation and significance. Here you must design figures that are clear to see/understand with few words and directed headings/figure captions.
5. Conclusion/discussion – 100-150 words (or a diagram) to summarize your main findings and future goals given your data.
6. Key references – relevant to the work (the word “key” is important as you don’t want to take up valuable poster space including every reference in your field).

Make sure you follow the guidelines available for you in the 4B06 WebCT course folder under “Poster Presentation Guidelines”.

### Poster Evaluation

**Biochemistry 4B06**

**Student Name:**

**Committee Member:**

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<thead>
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<th>Criteria (maximum marks)</th>
<th>Marks</th>
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<tr>
<td>1. Understanding the problem and its significance (5 marks)</td>
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<td>2. Experimental progress made (if progress made is inadequate please specify in the comments section reasons why) (6 marks)</td>
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<tr>
<td>3. Ability to interpret/analyze results (4 marks)</td>
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<td>4. Ability to answer questions (5 marks)</td>
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<td>5. Overall presentation (5 marks)</td>
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**Total marks (/25)**

**Comments:**

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