

## RESEARCH IN BIOMEDICAL SCIENCES COURSES (BIOM 4500, BIOM 4510 or BIOM 4521/2)

### COURSE DESCRIPTION AND REQUIREMENTS

In the Department of Biomedical Sciences, a variety of research course formats are available (single weighted and double weighted over 1 or 2 semesters). The courses are:

- (a) **BIOM 4500** (single weighted in 1 semester): - a literature review and research proposal (LR)
- (b) **BIOM 4510** (double weighted in 1 semester): - an experimental project (EP)
- or**
- (c) **BIOM 4521/2** (double weighted over 2 semesters): - an experimental project (EP).

### Objectives

These research courses are designed to expose students to biomedical research where information is created, interpreted and integrated with current knowledge, and to teach effective skills for communicating scientific information orally and in writing.

### Goals

The specific goals of these courses are to: (a) develop an appreciation for research, (b) improve library skills by researching the literature on a specific topic, (c) develop awareness of current research techniques, (d) develop the techniques and attitudes of critical thinking through evaluation of research data (student's and/or published reports), (e) teach problem solving and (f) improve written and oral communications skills. The courses are designed to give the student a realistic view of research by providing an opportunity for critical review of the literature (LR), and/or "hands-on" research (EP).

It is important to realize that these courses are at the undergraduate level where the emphasis should be on a small well-defined problem. These courses are not mini-Masters and certainly should not involve a rigorous series of experiments. Students will not be penalized when a project fails due to circumstances beyond their control. In such cases however, students should give a critical appraisal of the problem(s) encountered, and the emphasis in the project may be re-directed to improving the methodology. Once again, the research projects should be well-defined and have a reasonable likelihood of success.

### Faculty and Student Commitments

Bio-Medical majors may require both the single and one of the double-weighted courses for their programs. Thus, accepting a student may involve a commitment to 3 single course equivalents of research time (single plus either of the double-weighted courses) taken over 2 or 3 sequential semesters (depending on how the courses are arranged). The "0-6" and "0-12" h/week labels on the courses should be regarded as the minimum time commitment for students. In other courses, students are expected to work on course material after lectures and laboratories are finished. Research course students (particularly those doing "hands-on" experimental projects) can expect that they will have to spend more like 12-20 h/wk and/or work irregular hours to complete their research work. Students may have to deliberately limit the time that they devote to these courses if they find the work particularly interesting or demanding. If a student feels that a problem is arising, he/she must talk to the supervisor about either becoming more efficient, or limiting the workload. Students should also feel free to talk to the course coordinator.

### “Animal Utilization Protocol” Approval

Some projects may require working with live tissue/animals. Individual Faculty are responsible for obtaining the appropriate Animal Utilization Protocol to cover the work being done by Research project students under their supervision. Students should be aware of these protocols and understand their purpose. Discuss these with your supervisor

### Course Budget

A small amount of money should be available for each experimental project (not literature reviews) to help defray costs. The funds will be divided evenly among participating faculty. The amount will depend on how many experimental research projects are supported.(about \$70/research student).

### Academic Misconduct

The University of Guelph has adopted a set of policy guidelines to deal with academic misconduct. The University's view is that "academic misconduct is behaviour that erodes the basis of mutual trust on which scholarly exchanges commonly rest, undermines the University's exercise of its responsibility to evaluate students' academic achievements, or restricts the University's ability to accomplish its learning objectives." Never get yourself into a situation where you may be questioned about fabrication of research results and plagiarism because the University will deal severely with individuals who do these things. Make sure that you have the research results to support what you are writing about. It is understood that different people may interpret the same research results differently. On the issue of plagiarism, avoid this by learning how to cite the work of other people properly (study research papers, talk to your supervisor). If possible, avoid making repeated references to a given paper.

### Course Evaluation

**(important feedback - Please do not neglect!)**

Around the time of their seminars, students will be asked to **anonymously** complete a course evaluation by going to the CCS evaluation web site and completing the evaluation for your particular course.

[https://courseeval.uoguelph.ca/CEVAL\\_LOGIN.php](https://courseeval.uoguelph.ca/CEVAL_LOGIN.php)

If you see ways that the course could be improved, please say so on the evaluation form!

Your feedback is vital for us to assess the impact of the research courses and to fine tune the way we operate. It will be used by the course coordinator to make improvements to the course . The comments may also be read by the program Chairman and by people serving the Departmental Undergraduate Program Committee.

## Methods of Evaluation

- BIOM4500:**
- Formal seminar presentation - 30%.
  - Evaluation of your colleagues' seminars within your group - 5%
  - Final written report in the form of a literature review paper and research proposal - 40%
  - Assessment by the supervisor\* - 25% for research projects and reviews.

- BIOM4510:**
- Formal seminar presentation - 30%.
  - Evaluation of your colleagues' seminars within your group - 5%
  - Final written report in the form of a research project paper -35%
  - Assessment by the supervisor\* - 30%

- BIOM4521/2:**
- Interim report (1<sup>st</sup> semester) - 15% ---7.5% for seminar and 7.5% for written report
  - Evaluation of your colleagues' seminars within your group - 5%
  - Formal seminar presentation (2<sup>nd</sup> semester) - 30%.
  - Final written report in the form of a research project paper (30%).
  - Assessment by the supervisor\* - 20%. .

\*The supervisor's assessment might include factors such as: interaction with others on the laboratory, organization of time, preparation for meetings, development of technical competence. **The student should discuss the specific criteria for this assessment with the supervisor before the project begins.**

## The Formal Seminar

All students are required to give an oral presentation. This formal seminar will be presented using the 10/5 format commonly used in scientific meetings - a 10 minute presentation and a 5 minute question period. The emphasis in the presentation, and in the evaluation, should be on development of logical ideas and on effective communication utilizing MS Powerpoint 2007 only.

Ideally, the seminar should include the following components:

1. An Introduction - general terms to orient the audience and provide background information.
2. Objectives/Hypothesis - definition of the scope of the experimental project, or subject of the literature review.
3. Methodology/Experimental Design - this will provide an overview of the methods used, database accessed or literature covered.
4. Experimental Results/Summary of Literature.
5. Discussion of Results/Literature.
6. Summary/Conclusions - review of the main points and concise conclusions.

## Seminar Preparation:

All seminars are to be computer-generated presentations using the program, MS Powerpoint 2007 only. Supplemental audiovisual aids are **NOT** permitted. The presenter must keep in mind the time restrictions for the seminar. The presentations will be timed.

All students registered in the Biomedical Sciences Research Project courses **require** a network account (free of charge). To set this up after the course begins, go to your Webmail login page, Do not login but click on manage accounts and then change password. You can keep the same password or change it but you must go through the changing process. This will set up the account for you. With this network account, students have access to the computers in the **OVC Computer Laboratory in Population Medicine (Rm. 2500, OVC)**. Students will be able to use these computers day or night for: (a) word processing; (b) searching the literature and saving references with abstracts ; (c) reading Current Contents (lists papers in a multitude of journals that have just been published); (d) organizing your references (save references from searches and Current Contents to Procite); (e) producing visual materials for your seminars (use Powerpoint 2007), and (f) sending and receiving e-mail ( We will use e-mail to correspond with you during the semester). The course computer in the seminar room (Rm 1691, Biomedical Sciences) has been upgraded to Windows XP and Powerpoint 2007. Specific rehearsal times using that computer are provided in the week before the seminars. A sign-up sheet is placed on the door of Rm 1691 a day or two before rehearsals begin.

**\*NOTE: All seminar presentations must be brought to Tim Bast on disk or forwarded via the “V-drive/Workgroup Shares/Biomed Research Presentations/Place presentations here” to Tim Bast, for loading on the ‘V’ drive /Workgroup Shares/Biomed Research Presentations by 23:59 pm the day before your seminar session.** If not received by the required time, 5 marks will be deducted from your final average. This process precludes rebooting the computer between presentations. **Laptop computers or flash cards are not permitted**

### **Seminar Presentation:**

Specific days have been designated for the seminar presentations. After soliciting student/supervisor input (Seminar questionnaire), a program will be scheduled for a specific morning(s) and/or afternoon(s) of these days. Seminars will be at 15 minute intervals, with every attempt being made to accommodate your first choice of day/time (am/p.m.). It is important that your presentation be thoroughly rehearsed to ensure that it meets these time restriction. Presentations **will not** be allowed to run overtime.

Students are required **to be present for the duration of their session** to assist with the evaluation of their colleagues' presentations and to participate in the question periods. Each students must submit evaluations for all the peer presentations in their group. These evaluations **MUST** have their name **CLEARLY PRINTED** on the bottom of the page to receive the five marks. All present in the audience will be asked to evaluate and grade each seminar. Only seminar scores provided by the Faculty present will be used in determining the grade for the presentation. All evaluation forms will ultimately be returned to the student's supervisor, and **the supervisor will be expected to review these with the student as a means of providing feedback on the oral presentation.**

### **The Final Written Report**

The **final written report** on the literature review and research proposal or experimental project is due on the specified date (See current semester deadlines). The report must be submitted in duplicate for assessment by the supervisor and by a second senior reviewer not from their lab delegated by the supervisor.

**Experimental research projects (EP) should be written in the format of a journal paper** of the supervisors choosing with the following sections: Title Page, Abstract, Key Words, Introduction, Materials and Methods, Results, Discussion, Conclusions, and References. The emphasis will be on the presentation and discussion of the research data generated during the semester. Literature review and research proposal (LR) reports should be arranged in a logical manner which allows development of the topic. The format is flexible but there should be a Title Page, Abstract, Key Words, Introduction, appropriate sub-headings, Summary and Conclusions, and References. The references for both types of report should be in the format of one of the principle journals consulted during your research project.

Students who have done literature review (LR) projects **MUST** submit a short research proposal (2 page maximum, single spaced with a summary) as part of their topic. The proposal should include a clear statement of the problem in an introduction, a review of literature related to the problem, the rationale for the research, the methods proposed, the experiments proposed and the budget required to do the work. For costs, ask your supervisor where catalogues are kept in the laboratory: also ask for some suggestions on getting started. As a rough guideline for marking, **this grant proposal will constitute about 20% of the value of the final report.** The research proposal can centre around the general discussions that you may have had with your supervisor about a research project that you may start work on next semester. **Discuss the organization of your report with your supervisor before you start.**

It is proper for the supervisor to read a draft of the project final report once, and offer specific suggestions for improvement before the student submits the final version. Graduate faculty provide advice to their graduate students when the latter are drafting MSc or PhD thesis. This feedback is part of the learning process and should be part of these research project courses experiences as well. Students should schedule this preliminary reading with their supervisors well in advance of the due date of the report.

### The Interim Report (BIOM 4521/2 students only)

Students taking the two semester course will be required to provide an interim report for the first semester on their progress to date. This report consists of two components: an oral presentation (a 5 minute Powerpoint presentation followed by 5 min question period ) on one of the regularly scheduled seminar days for that semester **and** a written (2 page single spaced report) provided to the supervisor on the same date that all the other reports are handed to the supervisors. The purpose of the interim report would be primarily to identify the objectives/hypothesis being tested in the EP, the protocol being used (the research protocol for the project) and any progress to date. The formal seminar given in the second part of the course (BIOM4522) would concentrate more on the results and discussion of the overall project.

## Details of Seminar Requirement

Students are required to present one 10 minute seminar and answer questions from the audience for 5 minutes afterwards. The interim presentation in BIOM 4521 requires only a 5 min presentation and 5 min Q&A. In either case, by seminar day you should be able to gain a good understanding of the problem and what you aim to do to address it (those doing literature reviews). You will have had time to read most of the relevant literature: you can introduce your subject and take your audience as far into the problem as your knowledge allows. The emphasis in the presentations and in the evaluations should be on development of logical ideas and on effective communication with appropriate audiovisual materials. The style of presentation is important for creating a good impression but you will want to avoid giving a theatrical performance without substance. Generally, the subject should be introduced without any audiovisuals by looking at audience and telling them in simple terms why you are interested in the subject and how it might relate to them: then, the problem can be defined with the aid of an outline of the entire project, indicating perhaps that you will only cover the first 1-3 or 4 points in your presentation. Your audience will know where you will be directing your efforts in the weeks ahead. You can then present the details regarding the first 1-4 points and conclude. This format applies to literature reviews and experimental projects. During the question period, students (and faculty) will receive critical feedback before they go too far. The departmental evaluation form will be marked by everyone present. Faculty should feel free to come and go during these seminars like in a typical scientific meeting.

Learning how to use computers is essential in research today.

You should realize now that 10 minutes is very little time to make a presentation but this is what is standard at scientific meetings. It is sometimes very difficult to sort out what to present because you have so much stuff! However, this is part of your training in this course. The worst thing that you could do to overcome the problem is talk fast and try to cram the information into the time available. A better approach is to

- 1) Decide on a few opening lines using familiar words to introduce the subject (do not put outline up yet - look at audience).  
Why are you working on this topic?  
How does this relate to the audience or people in general?
- 2) Outline what you want to cover.
- 3) Cover it restricting yourself to 4 or 5 slides each with 5 - 6 lines maximum.
- 4) Conclude.

You have to introduce your topic well because the audience may not know anything about it. Relating the relevance of the work to you, the field or the Department gives the talk a context and helps people to become interested in what you say. If you are doing a review of literature, you can outline the full scope of the review indicating that you will only be covering the first 1-4 headings in your seminar. If you are presenting experimental findings, describe your idea and then your methods and results (if any): this an orderly approach that scientists can follow even if they are not familiar with your topic.

The short period allowed for each seminar has generally been handled well by the students. The main problem has involved developing the topics well but this comes back to focusing on the problem at hand rather than trying to give a crystal clear picture of the "universe" in 10 minutes! The 10 minute format in regular meetings of various Societies forces scientists to be brief and to the point. The clarity comes from them thinking in the planning stages about the points they really want to make. Students also need practice to develop this skill.

The assessment forms will be made available temporarily to the students immediately after their presentations. The forms will then be copied for the course file and given to the supervisors to review with their students. The forms should be given to the students for their Résumés as objective evidence of oral communication skills. The comments made on the evaluation forms may seem a little nit picky but our intention is to help students improve their communication skills. Take heed especially to common elements in the evaluations. Since there are usually fairly large differences between marks given by different faculty, we attempt to have each paper evaluated by at least 3 people. The average should be a reasonable indication of a student's ability to communicate scientific information orally. Try to use the comments to improve your next presentation.

While students may initially dread the thought of presenting seminars in front of faculty, they should realize that faculty are flesh and blood too and that their purpose is to help students with their projects: Consider us as friends rather than foes. The faculty present in the seminars also constitute a considerable resource base. You should feel free to "pick their brains" in the discussion. Look on the seminars as opportunities rather than ordeals. The faculty will be viewing the presentations from different perspectives. When a multi-disciplinary approach is adopted to solve a problem, one often finds that  $1+1+1 = 7$  (concept alluded to is not a "mistake" but a potentiation or synergism involving ideas). Surprisingly helpful suggestions can come out of the lively and constructive discussion. **The faculty realize that these research project courses are the first exposure that students will have had to research. You are not expected to perform at the level of an MSc or PhD student. Having said this though, it is reasonable to expect students in the last semesters of the BSc degree to be able to speak clearly in front of people, to use neat visual materials and to organize their thoughts when they introduce their subjects and progress from literature through their hypotheses, methods, data and its interpretation to conclusions.** Data and conclusions are not required in the seminars for this course - they have been scheduled too early for that.

Finally, you should take comfort from the fact that you and your supervisor probably know much more about your project than anyone else in the room.

## A CHECK-LIST FOR STUDENTS

1. You are responsible for finding a Professor to supervise your work. Arrange to meet with potential supervisors (from postings, past professors, professors working in an area that you now find interesting) to obtain agreement on a project (part of their research program). If you have a special project that you would like to pursue, ask the course co-ordinator for suggestions for a supervisor. Departmental Web sites or the Graduate Studies Office WWW site are also excellent because they list faculty and their interests. **This should be done as far in advance of the start of the semester as possible.**
2. Once you have arranged for a supervisor, have the supervisor sign your “SIGN-IN QUESTIONNAIRE” indicating his/her agreement to supervise your project. Students should indicate clearly whether they plan to do a literature review (LR) or experimental project (EP). **Return this form to one of the course coordinators along with your course registration forms and then he /she will sign a waiver form which allows you into the research courses.** Criteria for the supervisors assessment (the 20 -30% component of the final grade) should be discussed and agreed upon at the first meeting with your supervisor.
3. When the semester begins, **YOU** contact your supervisor and proceeding according to his/her directions.
4. Arrange a time each week to meet with your supervisor to discuss your progress.
5. You need to discuss the points raised in the “SEMINAR QUESTIONNAIRE”. This form needs to be returned to the course coordinator Tim Bast Rm1685 (complete all blanks please) before the deadline date to facilitate planning the seminar days. The sooner it is returned the greater the chance of getting your first choice of time. Students taking BIOM 4521 should indicate that this will be the interim report.
6. All seminars will be prepared using Powerpoint 2007 (See “The Seminar”). Assistance with Powerpoint can be obtained from Tim Bast, Rm 1685,OVC.
7. **Preview your completed computer-generated presentation** with you supervisor in the seminar room. Book a time(s) on the “sign-up sheet” that will be posted on the seminar room door Rm 1691 several days before the practice times are scheduled.
8. You are **required to be present for the entire session** in which you are scheduled to give your presentation. You are expected to participate in the question periods and to critique your colleagues’ presentations. Evaluation forms for every one in your group must be completed and submitted. These evaluations **must** have the students name **clearly PRINTED** on the bottom to get the 5 marks.
9. Complete a course evaluation on line at [https://courseeval.uoguelph.ca/CEVAL\\_LOGIN.php](https://courseeval.uoguelph.ca/CEVAL_LOGIN.php).
10. A preliminary draft of your LR and research proposal or EP report should be submitted to your supervisor for general comments and feedback before the final copy is submitted. Allow time for this to occur. Two copies of the final report on your LR or EP are due to your supervisor **on the specified day (see semester deadlines).**
- 11) Direct questions to the course coordinators, **Dr Brenda Coomber** ext 54922 Rm 3647 and **Tim Bast**, ext 54239, Room 1685, Biomedical Sciences.

## A CHECK-LIST FOR SUPERVISORS

1. Read section on course objectives and goals. Students may do a literature review and research proposal (LR) and/or a laboratory research project (EP) **in any order** using any of the 3 courses offered by Biomedical Sciences (spread projects over 1, 2 or 3 semesters). **Literature review in BIOM4500 only.**
2. Sign the student's "SIGN-IN QUESTIONNAIRE" indicating your agreement to supervise the student. This must be returned by the student to the course coordinators no later than the introductory session for the course (See Semester deadlines) so that a waiver may be signed allowing them in to course.
3. In the initial meetings with your student, focus on opening up lines of communication because regular one-on-one meetings with a professor are likely to be a new experience. Students may feel intimidated and be reluctant to ask or respond to questions. Discuss your expectations of the student and be sure to clearly identify the criteria you will use in assessing the student's performance (ie. the supervisor's assessment component of the overall evaluation). Discuss with BIOM4521/2 students, the requirements for the interim report (oral **and** written format).
4. Arrange weekly meetings with the student to discuss progress, assign tasks or just have a short chat. Try to monitor regularly the time that your student is spending on the course.
5. Review basics of doing literature search by computer ( OVC network ) or by hand
6. Discuss the questions posed on the **SEMINAR QUESTIONNAIRE** that your students needs to return to the course coordinator before the specified deadline. **Supervisors are expected to attend their student's oral presentation and to help evaluate other seminars in the time block selected.**
7. If you have to be away from campus for a significant period of time, arrange for your student to meet with a colleague at prearranged times. Contact can also be maintained by the FAX/email.
8. Preview your student's presentation before seminar day on the computer in the seminar room (Room 1691). Practice times are scheduled during the week preceding the seminars. The emphasis should be on a clear development of ideas relating to their EP or LR.
9. Discuss the seminar evaluations with your student when they are returned to you.
10. Be prepared to help your student meet your expectations if he/she is having to spent considerably more than 6 or 12h/wk on assigned tasks. We need to maintain a standard but the students also have to maintain other courses: help them with the balancing act. These courses should not develop into high pressure stressful exercises that put students off of research.
11. Provide guidance (re: prices of chemicals, disposables etc.) for their budgets in the research proposal.
12. Provide specific comments when your student asks you to review the preliminary draft of the final report. We help MSc and PhD students in such a way and should therefore provide written feedback to these research students.
13. The research proposal required at the end of the literature review should be worth  $\approx$  20% of the total for the report.
14. Two copies of the student's final report are due in your hands by the specified deadline. Find a senior colleague (not from your lab in order to provide independent objective assessment) to mark the second copy of the report. You will submit the two individual grades out of 100%.
15. Marks must be submitted to the course co-ordinator Tim Bast by e-mail or hand delivered **by 9:00 AM on the specified deadline** so that student grades can be compiled by the course coordinator for submission to the Registrar's Office

16. Give marks out of 100%. We will calculate the final grade.

**You can use a form similar to the one below to forward the marks by e-mail.**

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Student's Name \_\_\_\_\_ Supervisor \_\_\_\_\_

Course (Circle) BIOM4500 (LR): BIOM4510 : BIOM4521/2

(LR=literature review: EP=experimental project)

Interim report (BIOM4521/2 students only) = -----% \*

Supervisor's mark for final report = \_\_\_\_\_% \* Colleague's mark = \_\_\_\_\_% \*.

Supervisor's mark for general performance of student = \_\_\_\_\_%\*

Your trust account number for our accounts clerk if the project involved experimental work  
\_\_\_\_\_ (the funds available for such projects will be distributed by  
internal transfer late in the winter semester).

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Direct any questions to course coordinators, **Dr Brenda Coomber** ext 54922 email [bcoomber@uoguelph.ca](mailto:bcoomber@uoguelph.ca) or **Tim Bast**, ext. 54239 email [tbast@uoguelph.ca](mailto:tbast@uoguelph.ca) .

### Comments gleaned from Fall/94 Research Project Seminars in Biomedical Sciences

The purpose of these notes is to help people learn effective presentation skills. The contrast in the comments made on the excellent and average presentations indicate clearly what we all can do to present information better in public.

#### GENERAL

Do not hesitate - strive for a smooth presentation.

Try not to read your talk - let the overheads/slides be your "Q" cards.

To introduce your subject, put up your title/author information, look directly at the audience and explain the background/importance/relevance of your topic to the audience in simple words in no more than 1 min.

Increase eye contact to increase impact - avoid reading from overheads/slides.

In illustrations, include only what you need to make your point(s) - leave out the rest to avoid clutter.

Prune complex overheads/slides as much as possible and then develop a presentation strategy to make your points.

"Walk or lead" audience through diagrams using slow deliberate movements of a pointer (do not use finger or hand).

All presentations need a mixture of illustrations with pictures and verbiage - all verbiage is boring, boring ..

Make sure that overhead material will fit on screen - do not use vertical orientation of overheads and slides. Use the template provided with the course description. Make sure overheads are level when projected.

If preparing overheads manually, print (do not write), keep lettering large (use template) and use pleasing colours.

Try to be prepared to discuss the pros and cons of issue at hand.

End up giving the audience a clear idea of where you are going with the project.

Speak up! A person telling a lie is unfortunately more likely to be believed if he/she speaks loud!

#### COMMENTS MADE ON THE EXCELLENT PRESENTATIONS

You have a good project - sell it!

Try to avoid reading.

Relaxed manner - confident, very polished, concise and clear.

Well organized and clear (repeated many times).

Good eye contact while making introduction. The follow-up figure reinforced your short verbal introduction.

Introduction easy to follow/logical

Enthusiastic.

Voice clear, highly articulate.

Displayed good foresight of possible problems in the work and questions in talk.

Good eye contact (no notes) - comment repeated many times.

Explained terms well.

Get to know audience and pitch jargon level accordingly - avoid jargon in mixed audience.

Slides excellent/fantastic/state of the art.

Very nice introductory overhead (not an outline WLG)

Neat overheads.

Ideas reasonable.

Good summary and good timing.

Excellent grip of subject.

Thorough.

#### COMMENTS ON PRESENTATIONS AT LOWER END OF SCALE

Not clear what you hope to accomplish. Drive at a few key points and emphasise these.

Voice low, mumbled, rambled, lacked eye contact.

Overheads looked sloppy - highly questionable mix of colours.

Experiments not presented clearly.

Wandered without a clear aim.

Read less.

Reading from cards and changing overheads kept you too busy. Avoid reading. You cannot hold slide changer, hand pointer and "Q" cards all at same time (and be graceful about it - audience will be distracted).

Outline is no substitute for an introduction - give intro before showing outline.

Basically ignored the visual aids.

Got lost (evaluator that is) - experiments not presented clearly/ did not understand what you were going to do until question period.

Ideas not focused yet.

More clarity needed.

More diagrams needed (mentioned often).

Methodology not outlined.

Overheads smudged (ie printing).

Up tight.

It would have been easier to understand your rationale if you had started with your purpose/goal. Why are you telling me this story?

Be familiar with your material.

Put more enthusiasm/energy/excitement into your presentation.

Too much information, not clear what you planned to do - too many overheads.

#### CONCLUSION BY COORDINATOR

The collected negative comments above are not to be taken as ridicule of our students. Presenting Scientific information in a 10 min time slot is a very tough exercise when you have not had any practice doing this before. I know this - faculty know this. Use the comments to improve and by the way, fantastic, state of the art slides are not required to get a high mark in the seminars. In general, I am impressed at how well the students have performed. Good luck with your projects this semester.

**Supervisors should use these guidelines when grading the reports this semester. The information can be altered for subsequent semesters.**

### **RESEARCH PAPERS DESCRIBING EXPERIMENTAL RESULTS**

- 1) You should append the sample paper that was used as a guide for style. Each Journal has a "Guide to Authors" in one of its recent issues. You should consult that for the fine points on what is required (they all differ).
- 2) The TITLE should reflect the content of the paper and if possible, tell what you found. List 6 KEYWORDS at the bottom of the title page that best describe the work.
- 3) The words used should convey what you are thinking. For example, when starting a sentence with "This ....", make sure it is clear what "this" refers to.
- 4) The paper should be easy to read. If it has been written well, the ideas will flow from INTRODUCTION to METHODS, RESULTS and DISCUSSION without the reader having to flip back and forth repeatedly to check on methods, design, statistical methods, etc. The main points in a good paper are easy to grasp even though it is read rapidly. Generally accepted conventions are to write in the past tense, to avoid personal pronouns (I, We ...) and to leave 2 spaces between sentences. Also, try to avoid long sentences.
- 5) The INTRODUCTION should state the big picture and the problem that is being addressed. In other words, the hypothesis that is being tested should be stated clearly.
- 6) The METHODS should describe the procedures and equipment, and how the experiment was carried out, in a clear and accurate way.
- 7) The RESULTS contain the numbers and figures that describe your experimental findings. The data should be analysed statistically because the outcomes will determine the degree of confidence that you can have in the DISCUSSION when relating your work to published experimentation.
- 8) The DISCUSSION contains your interpretation of the results and a discourse on how your findings compare with what has already been published. However, in some journals, the results and discussion are presented together. A good argument for having the RESULTS on their own is that this part of the paper should remain valid for ever providing that the methods were sound. The DISCUSSION on the other hand may become redundant if your data is re-interpreted by another person or yourself some time after it is published.
- 9) The REFERENCE section is where you provide the information needed by others to find the papers you have read and cited in the text. You should have read the papers referred to in the "Reference" section. It is not acceptable to read what author "X" wrote about the work of authors "A", "B", and "C", incorporate this in your paper and then list the references for A, B and C as if you had read them. The problem here is that you could be repeating the mistakes of author X.
- 10) A common error made when people begin to write papers is that they put methods in the RESULTS and DISCUSSION sections. The next most frequent problem is that they intermix the results and discussion when they should be separate.
- 11) A **critical mind** will not accept everything that is published as being true or correct. The data in a published paper could be suspect because of poor methods. Furthermore, the interpretation of the data could be wrong for various reasons. High marks should be given to a report displaying evidence of critical thinking. This means being critical of your own work just as well as that of others. A critical mind will pick out **strengths and weaknesses** in data/literature and state these in a discussion. You can be critical in a straight forward manner without being nasty. This boils down to making evaluations correctly and fairly.

### **LITERATURE REVIEWS**

Following the TITLE, AUTHOR, ADDRESS and ABSTRACT, provide an outline of topics that will be covered and then INTRODUCE your topic as described above. After this, the terms in Bloom's taxonomy become useful (no reference available at the moment). They are used below are in order of increasing complexity. First, "**knowledge**" is the recall of specifics and can be terribly boring if you just go on and on with "Blonks (1994) found ..... and Henry (1996) reported..... Somehow, you have to convey a "**comprehension**" of the material or prove that you understand what you are writing about by the way you use the information /ideas. Next, comes "**application**" where abstract thought is used in particular situations. Various examples can be used to expand on an idea. Then the sweating begins. Everyone who has reviewed literature knows that what starts as a simple problem can fragment into many parts and present a real challenge because you have to cut things off somewhere. "**Analysis**" is the breakdown of a problem into parts. It is the sorting that you start to do after you have read a large number of papers. On the other hand, "**synthesis**" is the putting together of the parts to form a coherent story that advances a given field. Finally, "**evaluation**" involves the judgements that you make about various packets of information in your article. Here one looks for critical thinking as was discussed above to make sense out of what may have appeared at first to be contradictory information or references. If a literature review contains evidence of the latter elements in Bloom's taxonomy, it is literature research at its best and deserves a high mark. Also a short research proposal is included to give them an idea as to what is required to move this review to an experimental process.