WRITING ACROSS THE CURRICULUM
REQUEST FOR APPROVAL TO USE W–DESIGNATION

LSC # 33
Action Approved 1-31-91

TYPE I. PROFESSOR COMMITMENT

(X) Professor W. Barkley Butler Phone X 2147
(X) Writing Workshop? (If not at IUP, where? when? May 1990, IUP
(X) Proposal for one W–course (see instructions below)
(X) Agree to forward syllabus for subsequently offered W–courses?

TYPE II. DEPARTMENTAL COURSES

( ) Department Contact Person _____ Phone _____
( ) Course Number/Title _____
( ) Statement concerning departmental responsibility.
( ) Proposal for this W–course (see instructions below)

TYPE III. SPECIFIC COURSE AND SPECIFIC PROFESSOR(S)

(X) Professor(s) W. Barkley Butler Phone X 2147
(X) Course Number/Title Cellular Physiology, BI-350
(X) Proposal for this W–course (see instructions below)

SIGNATURES:

Professor(s) W. Barkley Butler 1/10/91
Department Chairperson Allan T. Anderson 1/10/91
College Dean. _____
Director of Liberal Studies Charles C. Smith 1-31-91

COMPONENTS OF A "WRITING SUMMARY"

(I) "Writing Summary" — one or two pages explaining how writing is used in the course. First, explain distinctive characteristics of the content or students which would help the Liberal Studies Committee understand the summary. Second, list and explain the types of writing activities; be especially careful to explain (1) what each writing activity is expected to accomplish as well as the (2) amount of writing, (3) frequency and number of assignments, and (4) whether there are opportunities for revision. If the activity is to be graded, indicate (5) evaluation standards and (6) percentage contribution to the student's final grade.

(II) A copy of the course syllabus.

(III) Samples of assignment sheets, instructions, or criteria concerning writing that are given to students.

Provide 12 copies to the Liberal Studies Committee.

I. WRITING SUMMARY - BI-350 "Cellular Physiology"

BI-350, "Cellular Physiology", is proposed for identification as a "W" course. The course is taught every other spring and is not listed as a Liberal Studies Elective. Because of the prerequisites, most of the students in the class are juniors or seniors. Most of the students are biology majors, though some could be from chemistry or the new biochemistry program. Class size is limited to 24. The course counts towards a biology major or minor.

Listed below, are the types of writing assignments I intend to use in the spring of 1992 when I expect BI-350 to be a "W" course. I taught this course once (spring 1990) and included considerable writing. Examples of those assignments and of the spring 1992 syllabus are attached.

There are four basic types of writing which occur in this class:

1. WRITING FOR EVALUATION (50% of grade). There will one minor and two major examinations. Examinations consist of three types of questions: (a) those which can be answered with diagrams, formulas and brief paragraphs and are designed to assess the student's knowledge of the basic concepts of cell biology; (b) longer essay questions which either ask students to explain some of the more complex processes which take place in cells or ask the students to apply their specific knowledge of basic concepts and information about cell biology to new situations in order to determine whether they understand the basic problems faced by living systems and how cells solve these problems; (c) problems in which students are presented with data from actual experiments and asked to interpret the data in such a way as to answer specific questions or evaluate specific hypotheses.

2. WRITING TO RECORD RESULTS OF LABORATORY WORK. Students are required to keep a laboratory notebook recording the purpose, procedures, results and interpretation of the experiments they perform in the laboratory. This was graded in the past, but will probably be checked by their peers or me for completeness in the future. Keeping a complete notebook is essential in order to write the research reports required for the course.

3. WRITING SCIENTIFIC PROPOSALS AND REPORTS (30% of grade). Students will be required to write proposals outlining either experiments they plan to carry out in the laboratory or research which could be performed to answer specific questions. These will be in the format of, though much simpler than, a research grant application. They will also write reports in the format of a scientific manuscript. These will be based on data from their laboratory experiments and possibly data sets they will be given. Their purpose is to train students in the type of thinking, experimental design and data analysis used by scientists and they will be evaluated accordingly. There will be several short proposals and reports and one longer proposal which will lead to work which will be reported in a long report. Some of these proposals and reports will be written by groups and both the long proposal and report will be revised at least once after consultation with the instructor. These proposals and reports will be evaluated on the clarity of the writing as well the scientific quality of the proposals and reports, as indicated above.

4. WRITING TO CRITICALLY READ THE SCIENTIFIC LITERATURE (20% of grade). Students will be asked to read papers from the scientific literature and write brief (1-2 typed pages) summaries of them including the hypothesis being tested, the design and results of the key experiment(s) and the conclusions reached as a result of the experiments. These will be graded on a simple 0-5 scale. They will also write one longer (10 pages) paper describing the experiments which form the basis for a specific piece of information found in their text. This paper is designed to further familiarize students with the primary literature of science and to develop an appreciation for the way in which scientific knowledge grows as a result of numerous contributions from many individuals. Progress on this paper will be monitored throughout the semester and graded on the basis of clarity of presentation and ability to critically focus on and interpret the key experiments from each cited paper which led to the final conclusions summarized in the text.

II. COURSE SYLLABUS - BI-350 "Cellular Physiology"

BI-350 CELLULAR PHYSIOLOGY

Spring 1992
Lecture (Time to be announced)
Laboratory (Time to be announced)

Dr. Barkley Butler Office Hours: (To be announced)
Office: Rm 7 Weyandt
Phone: 357-2147

MATERIALS FOR COURSE

1. Text: Molecular Biology Of The Cell, 2nd Edition by Alberts et. al.

2. Problems Book: Molecular Biology of The Cell - The Problems Book by Wilson & Hunt

3. Laboratory Notebook: A bound 8" x 10" notebook ruled graph paper style

COURSE REQUIREMENTS

1. Exams: (250 points) There will be three exams for this course. Two during the semester and one during the final exam period. The first exam (50 points) will cover material in Chapters 1-3 which review the background for this course. Exams will be primarily essay questions of various lengths with perhaps some short answer questions to test for basic knowledge. Exams will focus on an in depth understanding of the material in the text and an ability to work with the information you have learned. Some exam questions will be taken from "The Problems Book".

NOTE: The exam on chapters 1-3 will be during class period. The first of the two 100 point exams will be during lab period and the second will be during the final exam period.

2. Writing on the scientific literature: (100 points) You will be assigned papers from the scientific literature to read. You will then write brief (1-2 typed pages) summaries of them including the hypothesis being tested, the design and results of the key experiment(s) and the conclusions reached as a result of the experiments. There will be one paper due toward the end of the semester in which you will describe the key experiments (from the literature) which form the basis for a specific piece of information in your text. Details of these assignments will be given out early in the semester.

3. Writing scientific proposals and reports: (150 points) You will be required to write proposals outlining either experiments you plan to carry out in the laboratory or research which could be performed to answer specific questions. These will be in the format of, though much simpler than, a research grant application. You will also write reports in the format of a scientific manuscript. These will be based on data from your laboratory experiments and possibly also from data sets you will be given. There will be

several short proposals and reports and one longer proposal which will lead to work which will be reported in a long report. Most of the proposals and reports related to work in the laboratory will be proposing or reporting on work carried out in groups. Detailed instructions for these proposals and reports will be supplied in the laboratory.

4. Laboratory notebook: You will be required to keep a laboratory notebook (see handout on this) in which you will record the plans for and results of all your laboratory work. Some laboratory work will be carried out in groups. Your laboratory notebook and written reports and proposals, however, unless otherwise indicated, must be your own and should not be copied from lab partners.

GRADING

Your course grade will be based on a total of 500 points as described above and listed below.

Component	Points	Percent
Background Exam (Chapters 1-3)	50	10
Exam #1	100	20
Exam #2	100	20
Writing on scientific literature	100	20
Writing proposals and reports	150	30
Total	500	100

Your final grade will be based on your final percent of the 500 points possible. If you get the scores listed below, you can count on getting at least the grade indicated.

Grade	Total Points	Final Percent
A	450 - 500	90 - 100
B	400 - 449	80 - 89
C	350 - 399	70 - 79
D	300 - 349	60 - 69
F	0 - 299	0 - 59

PLEASE!!

1. Ask if you don't understand. In class, please do not hesitate to ask questions at any time. Outside of class, feel free to come to my office during my office hours to ask questions or discuss any problems or concerns you may have regarding the course. If you are not free during my office hours, you may make an appointment to see me at other times.

2. Plan to be present for all classes, labs and exams.

3. I am not here to teach you cellular physiology. I am here to help you learn it, which is quite a different thing. Much of our time together will be spent discussing the text and problems from "The Problems Book". IT IS THEREFORE ESSENTIAL that you READ THE ASSIGNED MATERIAL BEFORE COMING TO CLASS. If no questions are raised about some portion of the assigned reading, I will assume that everyone understands it thoroughly.

III. SAMPLE EXAM, ASSIGNMENTS AND GRADING SHEETS BI-350 "Cellular Physiology"

BI-350 BACKGROUND EXAM 2/7/90

THEME: "Life is self-replicating information (order) maintained by its ability to control a constant flow of energy." Butler

1. (2 points) Draw the general structures of a fatty acid and a triglyceride.

2. (2 points) Draw the structure of an amino acid representing the side-chain group as "R" and showing the correct form at pH 7.

3. (3 points) Draw the structure of a RNA trinucleotide with the sequence AUG. Represent the bases by the letters A, U and G, show it in the proper orientation with a triphosphate on the 5' end and a free hydroxyl group on the 3' end.

4. (3 points) "Biosynthetic reactions are often directly coupled to ATP hydrolysis." Consider two reactions:

ATP --> ADP + Pi Free energy change (delta G) = -12 kcal/mole
A-OH + B-H --> A-B + H2O Free energy change (delta G) = +5 kcal/mole

Show how these reactions can be coupled so that a cell can succeed in synthesizing A-B.
What will be the overall free energy change (delta G) for the process?

5. (2 points) From what you know of the evolution of life on earth, does it seem likely that life would have evolved elsewhere in the universe? Give reasons for your yes or no answer.

6. (8 points) Assuming life <u>has</u> evolved elsewhere in the universe, what general features would you expect it to share with life on earth and why? Consider types of molecules used for different purposes, general structures of the "units of life", problems to be solved, etc. Your answer to this question should be substantial and reflect <u>not only</u> what you learned in chapter 1 but a general understanding of chapters 2 (Small Molecules, Energy, and Biosynthesis) and 3 (Macromolecules: Structure, Shape, and Information).
<u>Hint</u>: Do not get bogged down in speculative details of proposed extraterrestrial biochemistry, etc. Think more in terms of principles, requirements and problems to be solved by extraterrestrial life forms.

BIOLOGY 350 LABORATORY NOTEBOOK SPRING 1990

NOTEBOOK:

Keep records of all your laboratory work during the semester in a bound notebook (approximately 8" x 10" ruled in graph paper style). On the cover print; NAME, SOCIAL SECURITY NUMBER, BIOLOGY-350, SPRING 1990.

FORMAT:

A. INDEX: Save two or three pages in the front of the book for an index. This should be arranged as follows.

Expt. No.	Title	Date Started	Pg.
1	A simple descriptive title	m/dd/90	1
2			etc.
etc.			

NUMBER ALL PAGES STARTING WITH THE FIRST EXPERIMENT FOLLOWING THE INDEX ON A RIGHT-HAND PAGE NUMBERED "1".

B. EXPERIMENTS: Each experiment should be presented as follows.

List Partners for this experiment: Expt. No. ____

1._____

2._____ Start m/dd/90

3._____ End m/dd/90

Descriptive title (same as in index)

PURPOSE: This should be a brief description, preferably in the form of a list, of the specific aims of this experiment. It is usually best to list the aims 1,2,etc.

REFERENCES: List here any references to the literature, your text, etc. which may have played a part in your design of this experiment. Include here any references to techniques you are using.

MATERIALS: List here the materials you used including cells, organisms, equipment, solutions, etc. This should include concentrations, pH, etc. of solutions.

PROCEDURES: Here describe, in order, the procedures you followed in carrying out your experiment. If you have described a procedure in a previous experiment in your notebook you may refer to it here by experiment number, date and page in your notebook. If you made any changes in the procedure you refer to, note them here.

RESULTS: Here give your results in tables, etc. as appropriate. Put down all the raw data INCLUDING "things which didn't work".

SUMMARY: Here summarize your data. This may be in the form of tables of calculated results, graphs, etc. Whatever is the clearest way to present your results.

CONCLUSIONS: Here list your conclusions and the limitations on the conclusions. This list should relate to the list of aims given in the "Purpose" section at the start.

QUESTIONS: Here list any new questions raised by this experiment. This may include ideas for new experiments, etc.

GENERAL COMMENTS ABOUT LABORATORY NOTEBOOK:

1. Your notebook should be as complete as possible and as brief.
   a. Lists are preferable to paragraphs in nearly all cases.
   b. Complete sentences are usually not necessary except in the "Purpose", "Conclusions" and "Questions" sections.

2. A person reading it should be able to know exactly what you did and be able to repeat it. It is as important to know what "didn't work" as to know what did. This should be an unedited record of your time in the laboratory.

3. Tables and graphs are the easiest ways to quickly see data and to see relations between things. Use them wherever possible to present your results in the "Summary" section.

4. From time to time I will collect and examine your notebooks or have you exchange them with classmates to examine. **KEEP THEM CURRENT!** DO NOT take notes on scraps of paper for later transcription to your notebook. Your notebooks will be checked for clarity, completeness and how closely they follow the format outlined above.

BIOLOGY - 350 SPRING 1990

INSTRUCTIONS FOR RESEARCH AND RESEARCH REPORTS

BACKGROUND INFORMATION

A research project is simply a project undertaken to answer a question or test a hypothesis. Scientists always begin with an initial observation or observations which lead them to ask a question or formulate a hypothesis. The next step is to search the scientific literature to find out if the answer to their question is already known, or whether their hypothesis has been tested. If their question or hypothesis is a new one, then they plan an experiment or series of experiments to answer the question or test the hypothesis. At this point they may return to the literature to gather additional background information essential to planning and carrying out their proposed research.

Today many areas of scientific research are quite complex. Research projects often require special equipment, supplies and trained assistants if they are to be carried out successfully. Many sources of research funding are available, of which the federal government is the largest and the one from which scientists in the United States most frequently seek support for their research. To obtain support, it is necessary to write a research proposal. This proposal states the question or hypothesis the scientist wishes to answer or test. It then describes the background information from the literature which relates to the project. Finally it describes the experimental procedures to be followed and lists the equipment, supplies and personnel needed. If the project is judged to be scientifically sound and worth while and if funds are available, then the applicant is given a grant to carry out the proposed work.

The results of scientific investigations are reported in meetings of scientists and, most commonly, in the research report, or Paper. These papers are published in scientific journals which circulate throughout the world. Today they are usually in English and most follow the format shown below.

TITLE: This is a descriptive title describing the project.

AUTHORS: A list of the authors, those who carried out the project.

ABSTRACT: This is a one paragraph summary of the contents of the entire report including the hypothesis which was tested, an outline of the experimental procedure which was followed and a brief summary of the results and conclusions.

INTRODUCTION: This section states the question to be answered or the hypothesis to be tested and describes, briefly, the background, that is, what is known about the subject from the literature.

MATERIALS AND METHODS: This section describes the materials used in the investigation and the experimental procedures and methods followed.

RESULTS: Here the results of the experiments are described and the data are presented, often in the form of tables and graphs.

DISCUSSION: In this section the results are discussed and interpreted as they relate to the questions or hypothesis stated in the introduction and as they relate to the background literature on the subject. In this section too the authors often state new questions or a new hypothesis resulting from their work. It is in the nature of science that the answer to one question usually raises two or three new questions, and thus no paper is ever really complete.

REFERENCES: This section lists the literature cited in the body of the report.

LAB REPORTS

NOTE: I used this in another course and will modify it for the more detailed reports described above, but it gives an indication of the type of guidance and feedback I try to provide.

In writing a lab report, the following format should be followed.

You should work in your lab table groups, but your grade will be based on individual reports. Write them as brief research reports in the following format. Be sure that your name and social security number are on the report and list the other members of your team.

INTRODUCTION: Here state your initial observation, any background information you may think is important (you do not need to look beyond the lab manual, text or lecture notes for background information), and state clearly the question or questions you set out to answer.

METHODS: Describe the procedures you followed to answer the question stated in your introduction. This may be just a simple list of what you did.

RESULTS: This section should contain your data, probably in the form of tables and graphs, and a few sentences describing your results and the data in the tables and graphs.

DISCUSSION: Describe any conclusions you think you can draw from the data and relate them to the original questions. There may be reasons that your conclusions are only tentative. You should mention these limitations on your conclusions as part of your discussion.

LABORATORY REPORT GRADING

Your laboratory reports will be graded on a ten-point scale. In addition to the grade, the following codes will indicate why points were taken off in one section or another.

CODE	REASON FOR DEDUCTING CREDIT
INTRODUCTION	
A	Initial observations are not clearly or completely stated.
B	No background information is presented.
C	Your hypothesis or questions to be answered are not clearly stated.
METHODS	
D	Your list of procedures seems incomplete.
E	Your procedures are not described clearly enough so that I could repeat your experiment.
F	From your experimental design, it is not clear that you operationally defined all the key words in your hypothesis or question.
RESULTS	
G	You presented little or no data.
H	Your data are not clearly presented.
	1. A graph would help.
	2. A table would help.
	3. Data need to be in quantitative form.
DISCUSSION	
I	You failed to state any conclusions.
J	You stated conclusions, but they do not seem to follow logically from your data.
K	You stated conclusions, but they do not seem to relate to your original question.
L	You stated conclusions, but they go well beyond what you can conclude from your observations.
M	You failed to mention any limitations on the conclusions you stated.
GENERAL	
N	You didn't provide headings for the sections of your report.
O	You didn't list your teammates.

BI-350 PAPER INSTRUCTIONS CELLULAR PHYSIOLOGY

Assignment: Write a paper describing the experiments which formed the basis of one specific piece of information in your text. You may choose from chapters 1-3, 5,8,9,10,12,13,17,19 or 21.

Length: 3-5 typewritten pages, double spaced plus drawings or illustrations as needed.

References: At least 3 but no more than 5 papers must be referred to. These should all be original papers in journals, not reviews. (Note: You may read a review if you want to in order to help you understand the topic and/or to assist you in finding the 3-5 most relevant papers. If you do, please list it following your other references.)

Format: Your paper should be in four sections with headings as listed below.

Introduction: State, in one or two sentences, the specific piece of information you are going to discuss. The introduction should include a quote from your text and may be either a subheading of a section or a specific sentence within a section. Reference this quote in parentheses by page, paragraph and line.

EXAMPLE

This paper will trace the development of the following concept: "The tight linkage between DNA synthesis and histone synthesis may be due, at least in part, to a feedback mechanism that monitors the level of free histone to ensure that the amount of histone made is appropriate for the amount of new DNA synthesized." (Text, page 518, paragraph 1, lines 9-12)

Experimental Evidence: In this section, present the evidence for the information or theory stated in the Introduction, citing your 3-5 references as you present material from each. You may want to include figures or tables from one or more of your references. If so, refer to them here and place the figures or tables themselves in an appendix at the end of your paper. The easiest way to present such information would probably be to xerox the appropriate figures, tape them on sheets of paper, numbered as you plan to refer to them in the text and then xerox the entire sheet.

You need not, and indeed should not, try to describe all of the experiments in the 3-5 papers you read. Instead, choose the few really key experiments and describe them.

EXAMPLE

The first evidence showing clearly that histone synthesis is tightly linked to DNA synthesis was presented by Robbins and Borun (1). The key experiment they performed was to ..... The results of this experiment are shown in Figure 1. (This would mean your Figure 1 in the appendix.)

Conclusion: Here briefly give your understanding of the concept or theory for which you have presented evidence and briefly summarize the evidence you have presented.

Suggestions:

1. Choose as specific a statement or idea as possible. You will be surprised how many published papers frequently lie behind even a single sentence in your text. Some subsection headings may be specific enough to use, but many are too broad.
2. References are given only at the start of each subsection. Hopefully these references will lead you to the specific idea you are interested in, but this may vary widely from section to section. The titles of the references at the ends of the chapters will help you in this regard.
3. You will probably be better off if you can find a topic where the reference given in your text is to a specific paper in a journal rather than to a review. A review is all right as a starting point, but will probably be a bit overwhelming and you may have trouble sorting out specific references to look up.
4. The schedule below lists times when you must see me for suggestions, but you should feel free to come in at any point with questions.
5. Once you have the first reference, key references to earlier work will probably be found in the introduction section.
6. Chapter 4 in your text describes many of the experimental procedures used by cell and molecular biologists. This should help you understand any techniques you may not be familiar with.

Schedule:

1. No later than Thursday, March 29:

   Turn in your Introduction statement of purpose and a copy of the first reference you have found. This will probably be the one cited in your text. Also list the 2-4 other references you expect to use. This list will probably be drawn from references cited in the introduction to the paper you turn in. I will check what you turn in to determine whether I think you have selected an appropriate topic and are on the right track in selecting references and then return all your material to you.

2. No later than Thursday, April 12:

   Turn in copies of all 3-5 of your references together with an outline of your paper. You should indicate the figures or tables you plan to use from your references. Again, I will check what you turn in, talk with you about it and return all materials to you.

3. No later than Thursday, May 3:

   Turn in your final paper together with copies of all references.

Relevant Journals

Title of Journal	In our Library Yes	No
Biochemical Journal	+	
Biochemistry	+	
Biochimica et Biophysica Acta	+	
British J. of Cancer		-
Cancer Research	+	
Carcinogenesis		-
Cell	76-79	
Developmental Biology	+	
Endocrinology	+	
European J. of Biochemistry	+	
European Molecular Biology Journal		-
Experimental Cell Research	+	
International J. of Cancer		-
J. of Biochemistry	+	
J. of Biological Chemistry	+	
J. of Cell Science		-
J. of Endocrinology	+	
J. of Molecular Biology	+	
J. of the National Cancer Institute	?	
J. of Cell Biology	+	
J. or Membrane Biology	+	
Molecular and Cellular Biochemistry	72-79	
Molecular Cell Biology		-
Molecular Endocrinology	+	
National Academy Of Sciences, Proceedings	+	
Nature	+	
Nucleic Acids Research		-
Science	+	

To: Liberal Studies Committee

From: Barkley Butler

Date: February 7, 1991

Subject: Writing-intensive proposal for BI-350
Course objectives

I am glad that my application to have BI-350 designated writing intensive was approved. I apologize for sending you a copy of my syllabus rather than the syllabus. The course objectives as described in the syllabus currently on file in the Biology Department office are listed below.

Summary of Objectives

A. To provide an overview of the field of cell physiology.

B. To provide familiarity with the concepts, terms, theories, and techniques of the field sol that the student possesses the confidence to engage in self-education in aspects of interest.

C. To provide a rationale for course work in chemistry, physics, and mathematics for the biology student.