

**HANDBOOK  
INTEGRATED PROBLEMS**

**BOSTON UNIVERSITY SCHOOL OF MEDICINE**

**2005-2006**

WEBSITE: <http://www.bumc.bu.edu/busm/ome>

## INTEGRATED PROBLEMS FACULTY

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## Integrated Problems

In this course discussion of clinical cases in small groups helps students develop methods for learning, integrating and teaching information from the case, concurrent and completed courses and from independent study. A goal is to help students continue to learn throughout their professional lives.

In the four terms of the course, as their medical science knowledge increases, students are expected to become increasingly skillful in analyzing cases, forming and testing hypotheses about them and learning and teaching in the group. The students' library research is expected to progress from use of textbooks and review articles to current articles presenting original research. Students are expected to learn to consult faculty members and others as research resources. They are expected to interact with their fellow students and facilitators in a professional manner at all times. Students are introduced to the library resources and taught manual and electronic literature searching at the beginning of Year 1. Library staff are available to discuss search design as needed. Textbooks, course notes and medical dictionaries are useful resources for beginning research on a topic, but **expansion of research beyond these resources is expected**. Faculty in all courses are valuable resources, as are other resources in the Medical Center and the community.

### Goals:

1. To promote active engagement of students in the pursuit, acquisition, organization and use of knowledge by enabling them to analyze a clinical case and answer questions posed by it.
2. To provide a stimulus to students to review, assimilate and integrate material from their basic science and clinical courses.
3. To help students develop effective skills in literature searching and use of other sources of information, and in verbal and written communication.
4. To foster collaborative learning learning, and teamwork and professionalism.

### Strategies

Faculty are trained in facilitating small-group discussion, giving appropriate feedback and evaluating student performance.

Students are trained by each other and the faculty in constructive small-group interactions and teamwork.

Students are trained in literature searching by expert library staff.

Field-specific faculty provide specific subject matter discussion for the course and serve as resources.

### Learning objectives:

Integrated Problems IA, Fall

Students will be able to:

1. Analyze and discuss a case, identifying facts and assumptions and stating pathophysiological and psychosocial hypotheses that may explain the causes and development of the problems presented.
2. Identify individual and group knowledge and ignorance about the evidence needed to support these hypotheses; state the basic science and other evidence for the hypotheses.
3. State focused research questions and the learning issues from which they are derived.
4. Find, evaluate, and synthesize the knowledge acquired using recent (5 years) texts and reviews, people and websites for research. State its application to the case and its relevance to the basic science and other courses.
5. Communicate research results clearly to the group in a focused presentation taking no more than **8** minutes, summarizing relevance to the case and briefly evaluating each resource used.

6. Ask clear focused questions of the presenter or the group and give clear, focused answers to others' questions.
7. At each session and at the end of each case, summarize learning from the case, including knowledge relevant to concurrent courses, and the group's understanding of the case.

#### Integrated Problems IB, Spring

1. Analyze and discuss a case, identifying facts and assumptions and stating pathophysiological and psychosocial hypotheses that may explain the causes and development of the problems presented.
2. Identify individual and group knowledge and ignorance about the evidence needed to support these hypotheses; state the basic science and other evidence for the hypotheses.
3. State focused research questions and the learning issues from which they are derived.
4. Find, evaluate, and synthesize the knowledge acquired using the original literature other appropriate resources. State its application to the case and its relevance to the basic science and other courses.
5. Communicate research results clearly to the group in a focused presentation taking no more than **6** minutes, summarizing relevance to the case and briefly evaluating each resource used; identify second-level questions arising from the information found.
6. Ask clear focused questions of the presenter or the group and give clear, focused answers to others' questions.
7. At each session and at the end of each case, summarize learning from the case, including knowledge relevant to concurrent courses, and make a pathophysiologically-based differential diagnosis, changing it as needed when more information is added.
8. Identify and discuss ethnic, cultural, social, occupational, lifestyle, environmental and behavioral factors related to the evolution of the clinical problem.

#### Integrated Problems IIA, B, Fall, Spring

1. Analyze and discuss a case, identifying facts and assumptions and stating pathophysiological and psychosocial hypotheses that may explain the causes and development of the problems presented.
2. Identify individual and group knowledge and ignorance about the evidence needed to support these hypotheses; state the basic science and other evidence for the hypotheses.
3. State focused research questions and the learning issues from which they are derived.
4. Find, evaluate, and synthesize the knowledge acquired using the original literature other appropriate resources. State its application to the case and its relevance to the basic science and other courses.
5. Report research using at most **1** minute for background information from a textbook or, preferably, a recent review and **4** minutes for specific information from the original literature or other sources; briefly evaluate resources.
6. At each session and at the end of each case, summarize learning from the case, including knowledge relevant to concurrent courses, and make a pathophysiologically-based differential diagnosis, changing it as needed when more information is added.
7. Identify and discuss ethnic, cultural, social, occupational, lifestyle, environmental and behavioral factors related to the evolution of the clinical problem.
8. Evaluate the evidence that supports the prevention, diagnosis, treatment and prognosis of diseases discussed. (Evidence-based medicine).

#### **Protocol for Sessions**

Groups of 6-8 students and a faculty facilitator meet once a week for 2 hours. **ATTENDANCE AT AND PARTICIPATION IN ALL SESSIONS IS REQUIRED OF ALL STUDENTS.** Students discuss a case and develop hypotheses, learning issues and research questions about the case. The following

week they discuss the answers to their research questions, and formulate new hypotheses and questions based on the information gathered and new information provided about the case.

An essential and unique aspect of this course is that students govern their own learning and teaching. The faculty facilitator guides the discussion as needed and evaluates the students' performance. In the first case discussion in Year I, the facilitator takes an active role, modeling for students the process of group learning and teaching. Thereafter students progressively take charge of the group sessions, directing discussions, critiquing reports, and choosing research topics. The schedule of case discussions may be altered by the group if more time is needed for a given case. The facilitator is not expected to give information about the scientific or other issues discussed; that role is taken by resource faculty, the literature and other resources identified by the students. **At the end of each session and again at the end of each case, the group, aided by the facilitator, should review the learning issues raised in the course of discussion and review the relationship of the learning to the concurrent courses and summarize the case.**

For each case students should be able to discuss:

1. the pathophysiology that underlies the signs and symptoms presented in the case.
2. the pathophysiological bases of the diagnostic tests used.
3. the multifactorial etiology of each disease or condition considered.
4. the rationale for the diagnoses made, tests ordered and treatment plans described.

Students' reports of their research should be concise, clear explanations to the group of information that contributes to understanding the case. Reports should not be read verbatim. They should include diagrams or pictures if relevant. Students should prepare a one-page outline of their presentation including their research question and a list of research resources used. A copy is to be given to the facilitator; distribution to other group members is optional.

The following summarizes the steps which are typically followed by a group as they consider a case:

1. READ CASE ALOUD
2. BRAINSTORM
  - facts
  - issues to be explored
  - hypotheses about the case
  - support for hypotheses; information the group already has
3. IDENTIFY, ASSIGN PRIORITIES TO & CHOOSE RESEARCH QUESTIONS
4. RESEARCH
  - search literature
  - contact agencies, people
  - search worldwide web
  - interview experts
  - critique resources found
5. NEXT SESSION
  - report research results and evaluation of them, discuss them, apply them to the problem
  - assess progress by reviewing first page
  - read the next page and consider new problems
  - continue the process

### **MD-PhD student sections**

Overall objective: To explore basic science or clinical research questions in addition to the other learning issues in the cases. MD-PhD students enter with some knowledge of and practice in analyzing data, framing questions about information given, performing literature searches and reading and evaluating original papers and reviews. They are encouraged to proceed through the discussion of assigned cases in a depth with a focus on research aspects and questions:

## Evaluations

The facilitator's evaluation is an important contribution to the student's learning and a major component of the student's grade. Feedback to the students is most effective if specific; therefore, facilitators are encouraged to take notes during the sessions. Evaluation of students should be timely and individualized. Facilitators meet individually with students at the midpoint and end of the course to give and discuss their evaluations; rooms and time should be scheduled by the facilitators with the help of the IP office if needed. Students and facilitators are encouraged to give feedback at group sessions as well as in individual conferences. The students' evaluations of the course and facilitators are major factors in the ongoing development of the course and quality control on it. The forms used are Handbook.

In the first year students are evaluated by their facilitators and by written examinations; examples are in the handbook. The examinations require the students to demonstrate that they can carry out **individually** the processes they have been learning in the group. At the end of the fall term, the exam tests the students' ability to state clearly **in writing** a hypothesis, evidence for and against it, and a research question to obtain additional information needed to evaluate the hypothesis. At the end of the spring term, the same skills are tested with the addition of a test of the student's ability to write a concise summary of the information derived from the research and apply it to the case.

## Grades

Facilitators' evaluations are graded Pass/Fail. Exams are graded Pass/Fail; Pass on two of the three questions in the Fall and on three of the four questions in the spring is required to Pass.

The course is graded Pass, Marginal Pass or Fail. A failing grade given by the facilitator results in a failing grade for the course. Failure on the exam results in a grade of Marginal Pass if the facilitator's grade is a Pass. The Marginal Pass can be remediated by taking a make-up exam; failure in the facilitator's evaluation can be remediated only by working in special sessions or repeating the course.

Attendance is required at all sessions, including the individual evaluation sessions. Unexcused absence will result in a failing grade for the term.

## Resources

The following faculty and staff members who manage the blocks in The Biology of Disease course can refer students to resources in their area:

Robert Lowe, M.D.	Gastroenterology	638-6566	D402	robert.lowe@bmc.org
Dick A.J. Brown, M.D.	Reproduction	534-4196	BCH, ACC4	dbrown@bmc.org
George Philippides, M.D.	Cardiovascular Disease	638-8700	C-8	george.philippides@bmc.org
Ravin Davidoff, M.D.	Cardiovascular Disease	638-8947	K604	ravin.davidoff@bmc.org
Joshua D. Safer, M.D.	Endocrinology/Nutrition	638-8881	E-201/M1022	jsafer@bu.edu
Ronald Goldstein, M.D.	Respiratory Diseases	638-4860	K604	jonina@bu.edu
Robert Hamburger, M.D.	Renal Diseases	638-7330	E428	hamburger.robert@boston.va.gov
Thomas Browne, M.D.	Neurology	638-8456	DOB707	tbrowne@bu.edu
Erwin Hirsch, M.D.	Surgery, Trauma Section	414-5689	DWLG2South	erwin.hirsch@bmc.org
Robert Simms, M.D.	Connective Tissue Diseases	638-4310	K509	rsimms@arthritis.bu.edu
Lewis R. Weintraub, M.D.	Hematology	638-7002	E501	lweintra@bu.edu
Mina Yaar, M.D.	Dermatology	638-5500	609 Albany	myaar@bu.edu

The Clinical Laboratory website: <http://www.internal.bmc.org/laboratory/> contains helpful information about clinical lab tests

The following faculty and staff are resources in Laboratory Medicine:

Steven Bogen, M.D.	Immunology	638-4103	L810	sbogen@bu.edu
Barbarajean Magnani, M.D.	Chemistry, Toxicology, Therapeutic Drugs, Protein Electrophoresis	414-4509	H303	BJ.Magnani@bmc.org
Nancy Miller, M.D.	Microbiology, Virology, Parasitology, Informatics	638-8705	H303	

### Librarian Information Consultants

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Keven Jeffrey, MLIS	638-6706	kevenj@bu.edu
Mary McKeon Blanchard, MSLS	638-4253	mamckeon@bu.edu

## INTEGRATED PROBLEMS FINAL EXAM, YEAR I

George Brown is a 15 year-old honor student and track team member at Boston Latin School. He has been healthy all his life. He visits his primary care pediatrician in the spring because of pains in his shins which occur primarily at night. He does not complain of joint pain or swelling. On questioning the pediatrician learns that George has noted increased tiredness over the past three weeks and has not felt like participating in his usually active social life. On further questioning, he says that his gums bleed easily when he is brushing his teeth. On physical examination, he is found to be pale, to have several small bruises on his upper and lower extremities and chest and to have hepatosplenomegaly. The pediatrician orders several lab tests. Later that day the hematology lab calls the pediatrician with their report. George's complete blood count (CBC) shows a hemoglobin of 8.5g/dl (normal 12-16), a mean cell volume (MCV) of 84fL (82-97), a reticulocyte count of 0.2% (1), and a platelet count of 58,000/uL (150,000-400,000). The peripheral white cell count is 24,000/uL (4,000-12,000) with blast cells seen on smear; there are 5% eosinophils. The pediatrician is upset by the report, calls the Greens to arrange urgent follow-up and considers the best way to tell the family the worrisome news.

1. Consider the case **as a whole** and develop a **concise hypothesis** which can explain the pathophysiology responsible for the information given. State this hypothesis in a single clear sentence.
2. Drawing on your own knowledge base and your courses, provide evidence that supports the mechanism(s) you have proposed in your hypothesis. Then read the case again and add discussion of information you have not included in your answer. Does this information support your hypothesis or argue against it or is it not related ?
3. Pick an area in which you need more information to support or refine your hypothesis. State a **single, focused, specific research question**. The question cannot be one asking for more information about the patient. The question must focus on the mechanism(s) or process(es) presented indicated in your hypothesis.

### THIS QUESTION IS USED ONLY IN THE SPRING EXAM

4. During the next week carry out your research and report the results on this page and the next. **Do not use additional pages or the backs of these pages; type your answer**. Use the following format:
  - a) summarize clearly the results of your research using your own words to synthesize and explain the material you have read. If you use a direct quote it should be very brief, placed inside quotation marks, and the source should be identified by a full reference.
  - b) relate your findings to your hypothesis and the case.
  - c) give the specific resources you used for your research, including title, author(s) volume, pages & date. Use at least one original journal reference from 2000 or later. If you use a website, give full information on author and evidence that it is a reliable site.

Guide to answering questions 1-3.

1. The hypothesis is a statement of the pathophysiological or other mechanisms which may explain the information given in the case. A hypothesis is not a diagnosis, which is a short label that may imply your hypothesis but doesn't state it.  
Example of a hypothesis:  
"George's fatigue and bleeding are the results of low red cell and platelet counts caused by destruction of the red cell and platelet precursors in his bone marrow".  
Example of a diagnosis:  
"George has leukemia".
2. Example: Red cells and platelets are produced in the bone marrow. Processes that damage their precursors in the marrow can cause: a) anemia (decreased red cells) that causes fatigue because the red cells are not carrying enough O<sub>2</sub> to the tissues; b) reduction in platelets that causes bleeding because the platelets are needed for normal blood clotting. Other evidence of blood abnormality related to bone marrow abnormality is the high white cell count and blasts in the blood smear. Blasts normally do not leave the marrow.
3. Examples: In a previously healthy young man, what are the most likely pathologic processes that can destroy the ability of the bone marrow to make red cells and platelets? OR Are there developmental stages shared by red cell and platelet precursors that might be damaged by the same agent?