

**Medical Biochemistry &
Genetics
BMS 6204**

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Director**
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2005 – 2006 Course Syllabus

[Click here for the schedule](#)

CONTACT INFORMATION:

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Class URL: Access via BLACKBOARD

Additional faculty will also participate as small group, case-based learning facilitators or lecturers.

Drs. Curtis Altmann, Michael Blaber, Akash Gunjan, Jamila Horabin, Mohammad Kabbaj, James Olcese, Johanna Paik, Branko Stefanovic, Yanchang Wang

COURSE MATERIALS

BLACKBOARD SITE:

This course is supported by a Blackboard site. All relevant course materials are posted to this site, excepting the learning resources listed below that students should purchase.

Included on the Blackboard site are the course Syllabus, Schedule of Course Activities and Topics, reading assignments (listed on the Activity Schedule), topic Outlines for each course subject, and the PowerPoint presentations that correlate with these notes.

Announcements, quiz keys and other course materials will be posted to the site as appropriate.

LECTURE PERIODS WILL INCLUDE INQUIRY-BASED LEARNING. STUDENTS ARE EXPECTED TO BE SUFFICIENTLY FAMILIAR WITH THE ASSIGNED READING AND RELATED TOPIC OUTLINE TO ASK QUESTIONS AND PARTICIPATE IN CLASS DISCUSSIONS.

REQUIRED RESOURCES:

Primary Biochemistry Text: John Baynes and Marek H. Dominiczak *“Medical Biochemistry, 2nd Edition”*, Mosby (New York, 2005) ISBN:0-7234 3341 0 (paperback)

Primary Medical Genetics Text: Lynn. B. Jorde, J.C. Carey, M.J. Bamshad & R.L. White, "*Medical Genetics*" 3rd Edition, Mosby (New York), 2003 ISBN: 0-323-02025-9 (paperback)

RECOMMENDED for REVIEW:

Basic Biochemistry Review & Workbook: Dawn B. Marks, "**Board Review Series (BRS): Biochemistry**", 3rd Edition, Lippincott, Williams & Wilkins, Baltimore, MD (1999) ISBN: 0-683-30491-7 (paperback)

OTHER COMMONLY USED RESOURCES:

E-Book (accessed through COM Library Web Page: R.K. Murray et al., "*Harper's Biochemistry, 26th Edition*", Appleton & Lange (Stamford, Conn., 2000), <http://www.accessmedicine.com/resourceTOC.aspx?resourceID=18>; C. R. Scriver et al, "*Online Metabolic and Molecular Basis of Inherited Disease*", McGraw-Hill, <http://genetics.accessmedicine.com/> ; T.D. Pollard and W.C Earnshaw, "*Cell Biology*", Saunders (2004)

OTHER USEFUL LEARNING RESOURCES

General Texts:

T.M. Devlin, *Textbook of Biochemistry with Clinical Correlations* (5th Ed.), Wiley (2001)

C.K. Mathews, K.E. Van Holde and K.G. Ahern, *Biochemistry* 3rd Ed., Addison-Wesley-Longman (2000).

R.H. Garrett and C.M. Grisham, *Biochemistry* (2nd Ed.), Saunders College Publishing (1999).

WWW Resources/Databases (see also resources accessed through COM Library Web Page):

NIH/NCBI (National Institutes of Health, National Center for Biotechnology Information) <http://www.ncbi.nlm.nih.gov/>

WebMD (access through COM Library)

Web of Knowledge <http://isi0.isiknowledge.com/portal.cgi>

THE Medical Biochemistry Website: <http://www-isu.indstate.edu/thcme/mwking>

COURSE DESCRIPTION:

Medical Biochemistry and Genetics is a five credit course offered in the third semester of the first year of the medical curriculum, concurrent with Doctoring 103 and Clinical Physiology. The course goal is to provide the foundation for producing graduates who are knowledgeable in the fundamental biochemistry and genetics of normal and abnormal body processes. Students will apply this knowledge to course discussion of the biochemical and genetic bases of common or representative diseases, including their symptoms and treatments. They will come to understand

and be able to evaluate potential advances of diagnostic and treatment modalities. The content of this course provides students with a foundation upon which to build in second year courses, clerkships and graduate medical education. Student small-group learning experiences encourage professional behavior and teamwork in a context that promotes use of resources such as the library, faculty and information technology. Course topic scheduling is coordinated to prepare students for and reinforce topics in Clinical Physiology. The following list is illustrative of the educational objectives of this course. Through interactive lecture sessions, small group sessions, and course examinations, students will be able to:

Knowledge:

- 1) Recognize and explain the functions of the key molecular components and steps of the synthesis, assembly, and degradation of biological macromolecules;
- 2) Recall and relate the molecular structures and chemical properties of biological macromolecules to their functions including ligand/substrate recognition, enzyme reactions, formation of multi-molecular complexes; and regulation;
- 3) Relate digestive processes and body production of usable and storable chemical energy to the chemical composition of foodstuffs, including vitamin and nutrient requirements;
- 4) Describe the inputs and outputs of human intermediary metabolism, and relate mechanisms of metabolic regulation by hormones, feedback loops and other mechanisms to body organ systems and their demands for energy and metabolites;
- 5) Recognize and explain the molecular basis of major body mechanisms for self-recognition and self-defense including blood factors, antibodies, anti-oxidants, hemostasis, and glucose homeostasis;
- 6) Describe key features and operating principles of the organization of the human genome, control of gene expression and cell cycle regulation;

Skills:

- 7) Relate knowledge of normal bio-molecular structure-function relationships, metabolic and regulatory processes, and defense mechanisms to the molecular basis, diagnosis and treatment of diseases;
- 8) Recognize and explain the sources, detection and consequences of genetic defect(s) underlying diseases;

Attitudes/Behaviors:

- 9) Demonstrate a professional attitude and good communication skills by effective participation in cooperative problem solving, especially in small group exercises directed towards understanding the biochemical and genetic bases of disease origins, diagnoses and treatments.

INSTRUCTIONAL METHODS:

- 1) Lecture (50 contact hours in 1 hr. sessions)
- 2) Small group, case-based learning (38 contact hours in 23 sessions of 1-2 hr.)
- 3) Tutorial (voluntary problem-solving and student-initiated discussion, max 15 contact hrs.)
- 4) Review (voluntary before exams, 4 contact hrs max.)

Lecture periods consist of presentation and discussion of basic biochemical principles as they relate to normal organ function and life processes, and to well-understood medical conditions. Lecture periods are scheduled for one hour each, usually four times per week (see detailed schedule). Entering students are expected to have mastered a minimum of one semester (4 credit hours or equivalent) of general biochemistry, and also biology courses with classic genetics and basic molecular biology content. Brief reviews of basics will be given in lectures, but lecture periods will generally be devoted to more advanced topics and assume that the prerequisites have been met. Students are encouraged to request review of fundamentals during voluntary Tutorial sessions held weekly.

Tutorial sessions held weekly by the Course Director are intended to allow students opportunity to ask questions about topics recently presented in lecture or small group exercises. The sessions also allow opportunity to review basic biochemistry and genetics principles, since it is recognized that student competencies in biochemistry vary considerably. Student attendance is optional. Students are encouraged to provide specific questions in the published topic or indicate a different subtopic for review. As time permits, problem-solving will be practiced during Tutorial sessions using pre-selected problems, usually from the recommended workbook

Small group, case-based learning sessions are intended to reinforce subject material covered in lecture periods, to expand knowledge and understanding of the biochemical and genetic basis of common or representative diseases, and to illustrate applications of the subject material to present and future clinical medicine. Typically two exercises are completed per two hour session. Clinical cases or disease states are reviewed in most exercises to learn how biochemistry and genetics are applied to understanding, diagnosis and treatment of disease. Some exercises consist of reviews of recent 'science news' articles to learn about and understand scientific advances affecting future medical practice. Case-based learning exercises integrate biochemistry, physiology and genetics insofar as practical.

Review sessions are voluntary and student-initiated are held before each examination.

COURSE CONTENT AND OUTLINE:

See **Schedule of Activities and Topics** posted under "Syllabus" on the **Blackboard** site.

SOME EXPECTATIONS IN THIS COURSE:

Tutorial sessions and Biochemistry fundamentals.

This course cannot cover all the biochemistry, medical and molecular genetics that you eventually will be called on to know. You will be called on to know a great deal more in your USMLE Step 1 exam, in your year two courses, and as a physician. You are expected to come to this course with organic chemistry and one to two semesters of biochemistry (4 credit hours minimum), plus knowledge of cell and molecular biology and genetics covered in undergraduate biology pre-med courses. Although I will review a number of basics in these subjects, we cannot take class time to review them all or deal at great length with any one topic. I have provided you with guides to sections of the Workbook and text that will assist you in reviewing foundation material not covered explicitly in class. The tutorial periods also are intended to provide opportunities for me to assist students in reviewing fundamentals.

Sessions will be most productive if you come to tutorial sessions prepared to ask questions or with topic areas that you would like to review.

Review requests can be sent to me by email before tutorial and review sessions.

Lecture periods, Topic Outlines and core course content:

The core content of this course is defined in the context of lecture periods, the corresponding course *Topic Outlines*, provided on the **Blackboard site**, and the related reading assignments in the text. Topic outlines are not intended to replace the text, but to guide your study.

Reading assignments are included in the *Schedule of Activities and Topics*, along with related readings in other sources that may assist your understanding of the subject.

Read and become sufficiently familiar with material in the reading assignment and appropriate Topic Outline before each class period to respond to questions and participate in discussion.

To efficiently guide your learning I would like to spend some of the lecture period in an inquiry-based mode devoted to the more difficult aspects of the subject material. This mode will only be successful if you come to class prepared with a reasonable degree of knowledge of the subject.

Small group, Case-Based Learning sessions:

Some connections between basic content and clinical applications are made in lecture periods, but the CBL sessions allow opportunities to examine more clinical connections in a format that invites discussion and integration of biochemistry/genetics with more advanced clinical knowledge. The CBL sessions thus serve the purposes of reinforcing knowledge gained in lecture periods, and

expanding knowledge to understanding diseases/disorders, their diagnoses and treatments. No special preparation is required for the CBL sessions, but after the sessions you should study the commentaries provided to understand fully the sessions, and be prepared to answer related questions on examinations. Approximately 15-20% of the content of each examination will be devoted to material covered in the small group sessions and not in lecture. (NOTE: Material unique to the small groups will not be tested on quizzes.)

Study CBL commentaries after sessions to consolidate and verify knowledge.

GRADING/EVALUATION:

How Grades will be determined:

Unit Examinations: Four, 1 hr. examinations at approx. 4 week intervals.

Quizzes: Ten, 10 min. quizzes on Thursday prior to case-based learning exercises, excepting exam weeks.

Final Examination: NBME Subject Examination in Biochemistry.

A student's letter grade will be based on the average percentage of questions answered correctly in each of the above evaluations. The contributions of the evaluation modes are as follows.

Unit examinations:	$17\% \times 4 =$	68%
Quizzes:	$2\% \times 8 =$	16% (best 8 of 10)
NBME Final Exam:		16%
TOTAL:		100%

Attendance: A percentage point will be deducted from the total if a student has more than three (3) unexcused absences from lecture periods. See full attendance policy below for other situations.

Letter grade scale

A = $\geq 90\%$ correct
B+ = 87-89
B = 80-86
C+ = 77-79
C = 70-76
D = 65-69

$$F = \leq 64$$

(Numerical scores are rounded according to standard convention.)

Self-evaluation and Instructor case-based learning assessment:

Students will be asked to fill out short self-assessment forms at the course mid-term and end. Analogous evaluation forms will be completed by case-based learning facilitators. Each student will be sent a brief mid-term report by the Course Director indicating notable areas of strength or weakness in case-based learning performance, and any other comments or concerns deemed appropriate. Students with notable weaknesses in performance will be counseled by the Director. These assessments will not be applied to the final letter grade, but will be retained by the Director for future evaluations, when appropriate.

Faculty and Course Evaluation:

Students will have the opportunity to evaluate each faculty member, using a standard evaluation questionnaire, at the conclusion of a major block of material presented by that instructor. Students will also have the opportunity to evaluate the course at its conclusion. Suggestions and comments concerning the course, its material and conduct, are welcomed and may be made to the Course Director at any time.

COURSE POLICIES and RESPONSIBILITIES:

The following Attendance, Remediation, Honor Code, and ADA policies have been adopted by the Florida State University College of Medicine for all courses:

Attendance policy:

The following policies have been adopted by the Florida State University College of Medicine for all courses in the medical curriculum.

Students are expected to attend all scheduled activities. Students are expected to be on time. Being on time is defined as being *ready to start* at the assigned time. If a student has an emergency that prevents her/him from attending a scheduled activity, she/he is to call and notify the Office of Student Affairs and request that they inform the supervisor/professor for that activity. If at all possible, the student should also call and, at a minimum, leave a message with the course director. *It is important that students realize that their absence or tardiness negatively impacts a number of other people.* Attendance, including tardiness, is part of the student's evaluation for professionalism. Negative evaluations may result in decreased grades and, in severe cases, referral to the college Student Evaluation and Promotion Committee.

Procedure for Notification of Absence:

If the student knows in advance of an upcoming legitimate absence, the "Advance

Notification of Absence from Educational Activity(ies)" form should be completed with signatures from the student, the Assistant Dean for Student Affairs, and the Course Director. The form will be filed in the Office of Student Affairs. The implications for the absence (*e.g.*, remediation, course grade adjustment, make-up exam, etc.) will be given to the student by the course director and final decisions regarding these actions shall rest with the course director.

If the absence occurs due to an unforeseen emergency, the student should contact the course director and the Assistant Dean for Student Affairs immediately to report the absence, including the reason for the absence. The implications for the absence (*e.g.*, remediation, course grade adjustment, make-up exam, etc.) will be given to the student by the course director and final decisions regarding these actions shall rest with the course director.

Remediation Policy for Absences from Examinations, Quizzes, Small Group Sessions:

1. **POLICY ON MISSED EXAMINATIONS:** Students are required to take major in-term and final examinations. According to the curriculum committee a student can only be excused from an examination by a student affairs dean/course director decision based on the personal situation of the student. Also, according to the curriculum committee decision and the existence of the FSU-COM honor code, the student will be given the same examination given to the other students. *In this course (BMS 6204) all examinations must be made up within one week of returning to class.*

2. **POLICY ON MISSED QUIZZES:** Students are required to take scheduled and unscheduled quizzes in the courses. A student can only be excused from a quiz by a student affairs dean/course director decision based on the personal situation of the student. Also, according to the curriculum committee decision and the existence of the FSU-COM honor code, the student will be given the same examination given to the other students. *In this course (BMS 6204) there are no make-up quizzes unless the absence is excused and the student has notified the Director in advance and arranged for a make-up time. Quizzes must be made up by 5:00 pm of the second class day after the quiz was administered. A quiz missed because of an excused absence will be used as one of two dropped quiz grades. A quiz missed because of an unexcused absence will be scored as a 'zero' and cannot be included as one of the dropped quiz grades.*

3. **POLICY ON MISSED SMALL GROUP AND LABORATORY SESSIONS:** The student should contact the course director or small group leader for instructions on remediation of the missed session and the material covered. *In this course (BMS 6204) missed small group sessions must be made up within 1 week of returning to class. Case-based learning sessions are made up by handing in the answers to the exercise questions, written in the student's own words.*

Unexcused Absences

Each unexcused absence from an academically required small group, laboratory, PBL, or other group activity where students are broken into smaller meeting units, will be penalized by deduction of the points attributable to the quiz administered for

that session, if applicable, from the "final point score." A percentage point will be deducted from the total class average if a student has more than three (3) unexcused absences from lecture periods. Students who have an unexcused absence from an examination will lose the entire score (points) awarded for that examination, and the final grade for the course will reflect this loss. *Students with more than two such absences in the Fall Term will not receive academic credit for the course, and a grade of "F" will be submitted to the Registrar.*

Remediation Policy for Students Who Fail a Course:

Remediation of courses will be planned and implemented by a decision of the Evaluation and Promotion Committee in collaboration with the course director.

ACADEMIC HONOR CODE:

Students are expected to uphold the Academic Honor Code published in The Florida State University Bulletin and the Student Handbook. The Academic Honor System of The Florida State University is based on the premise that each student has the responsibility (1) to uphold the highest standards of academic integrity in the student's own work, (2) to refuse to tolerate violations of academic integrity in the university community, and (3) to foster a high sense of integrity and social responsibility on the part of the university community.

Please see the following web site for a complete explanation of the Academic Honor Code.

<http://www.fsu.edu/Books/Student-Handbook/codes/honor.html>
<http://www.fsu.edu/Books/Student-Handbook/>

AMERICANS WITH DISABILITIES ACT:

Students with disabilities needing academic accommodation should: (1) register with and provide documentation to the Student Disability Resource Center; (2) bring a letter to the instructor indicating the need for accommodation and what type. This should be done during the first week of class. For more information about services available to FSU students with disabilities, contact the

Student Disability Resource Center
Dean of Students Department, 08 Kellum Hall
Florida State University
Tallahassee, FL 32306-4400
(850) 644-9566 (voice) (850) 644-8504 (TDD)
SDRC@admin.fsu.edu; <http://www.fsu.edu/~staffair/dean/StudentDisability/>

(This syllabus and other class materials are available in alternative format upon request.)

Integration of this Course with COM Goals and Objectives:

BMS6204: Medical Biochemistry & Genetics

General Competency	KEY	Institutional Learning Objective (Primary objectives addressed by this course are in BOLD)	Outcome Measure(s)
	<u>K=Knowledge S=Skills</u> <u>AB=Attitudes/Behaviors</u>		
Professional values, attitudes, and behaviors	AB1	Display the personal attributes of compassion, honesty, and integrity in relationships.	Observational assessment by faculty in small group learning setting.
	AB3	NA	
	AB6	NA	
	AB7	NA	
	S15	NA	
	AB9	Demonstrate respect for the roles of other healthcare providers and of the need to collaborate with others	Observational assessment by faculty in small group learning setting.
Moral reasoning and ethical conduct	K10	Describe and discuss the implications of basic ethical principles....	Observational assessment by faculty in small group learning setting.
	AB4	Demonstrate professionalism and high ethical standards ...	Observational assessment by faculty in small group learning setting.
Communicating with patients, families, and colleagues	S1	NA	
	S7	NA	
	S8	Demonstrate the ability to build rapport and to employ active listening and relationship enhancing behaviors.	Observational assessment by faculty in small group learning setting.
	S13	Demonstrate the ability to communicate compassionately and effectively...	Observational assessment by faculty in small group learning setting.
	AB2	NA	
Application of basic biomedical and behavioral sciences to patient care	K1	Recognize the scientific basis of health, disease, and medicine in the management of common and high impact medical conditions in contemporary society.	Performance on NBME subject and comprehensive examinations; USMLE Step 1 and 2 performance; internal examinations;
	K2	Describe the development,	Performance on NBME

		structure and function of the healthy human body and each of its major organ systems at the macroscopic, microscopic, and molecular levels.	subject and comprehensive examinations; USMLE Step 1 and 2 performance; internal examinations;
	K3	Recognize and discuss the implications of altered structure and function (pathology and pathophysiology) of the body and its major organ systems that are seen in various diseases and conditions.	Performance on NBME subject and comprehensive examinations; USMLE Step 1 and 2 performance; internal examinations;
	K4	Identify changes in the structure and function of the human body associated with the aging process and be able to distinguish normal changes associated with aging from those that denote disease.	Performance on NBME subject and comprehensive examinations; USMLE Step 1 and 2 performance; internal examinations;
	K5	Describe the molecular basis of diseases and maladies and the way in which they affect the body (pathogenesis).	Performance on NBME subject and comprehensive examinations; USMLE Step 1 and 2 performance; internal examinations;
	K7	NA	
	K12	NA	
	S9	Demonstrate the effective use of pharmacotherapeutic agents and other therapeutic modalities, while teaching patients the importance of preventative medicine, health promotion, and wellness.	Performance on NBME subject and comprehensive examinations; USMLE Step 1 and 2 performance; internal examinations;
Clinical skills		NA	
Problem solving and critical thinking	K6	NA	
	S3	Demonstrate the appropriate use of laboratory tests ... in making diagnostic and treatment decisions.	Observational assessment by faculty in small group learning setting.

	S4	Demonstrate the ability to evaluate the patient's medical problems and to formulate accurate hypotheses to serve as the basis for making diagnostic and treatment decisions.	Observational assessment by faculty in small group learning setting.
	S5	NA	
Lifelong learning and information management	K11	Describe strategies to support lifelong learning via both print and electronic sources to assist in making diagnostic and treatment decisions	Observational assessment by faculty in small group learning setting.
	S11	Demonstrate the ability to acquire new information and data and to critically appraise its validity and applicability to one's professional decisions...	Observational assessment by faculty in small group learning setting.
	S12	Demonstrate the ability to organize, record, research, present, critique, and manage clinical information.	Observational assessment by faculty in small group learning setting.
Social, cultural, and community context of health, illness, and care	K8	NA	
	K9	NA	
	K14	NA	
	AB8	Demonstrate awareness of the unique health care needs of ethnically diverse populations and communities.	Observational assessment by faculty in small group learning setting.
Personal awareness	AB5	NA	
	S17	Recognize abilities and limitations; know when to request assistance.	Observational assessment by faculty in small group learning setting.
Organizations, systems, and quality improvement	S14	Demonstrate the ability to work effectively as part of a health care team...	Observational assessment by faculty in small group learning setting.
	AB10	NA	
	K15	NA	
	AB11	NA	
	S18	NA	

Relationship of course objectives to Curriculum Committee "Eight Principles"

1. Promote a student-centered curriculum.

The Course Director provides a supportive environment by listening to student comments, responding to student queries after class, during office hours and by email; and by meeting occasionally with representative student subgroups. Several changes in the course have been made in response to student suggestions. Weekly 'tutorial' sessions are regularly scheduled to allow students to identify subject areas needing reinforcement in an informal, individualized setting. Separate review sessions are scheduled before each examination. Quizzes are given weekly between block examinations to encourage students to stay current. The course pace, subject coverage and total contact hours are sensitive to demands on student time. Data on biochemistry courses offered at other institutions suggests that contact hours for this course are moderate in comparison to many other institutions.

2. Provide a context-framed educational plan.

The lecture portion of this course contains numerous references to connections between diseases and the underlying biochemistry. The textbook was chosen in part because of the strongly physiological approach and multitude of clinical correlations. Nearly half of the required contact hours are spent in small group sessions in which students look up information to answer questions and solve problems related to a narrative description of a clinical case (~ 80%) or disease state (~ 20%). While the major emphasis of each exercise is to examine the biochemistry and genetics underlying the disease state in question, students are required to examine clinical issues related to symptoms, treatment and/or prognosis in each case. Ethics issues are also addressed in appropriate contexts. In total students examine the biochemical basis of about 40 diseases/conditions.

3. Integrate within years and across the curriculum.

The biochemistry course was strongly integrated with physiology after discussions with Dr. Posner. Choice and sequencing of biochemistry topics was done so that the chemical principles underlying physiological processes were provided students before the subject was covered in physiology. The main text has a strong physiology slant. Discussions with Dr. Paull about the Microanatomy course guided choice of topics related to cell and molecular biology. Coverage of cell signaling built on a foundation provided in Neurobiology. Material on antibodies, inflammation, hemostasis and other body defense mechanisms was included based in part on feedback from Dr. Klatt and my observations of topics covered in Pathology.

4. Base curriculum on measurable competencies (see separate document).

5. Encourage and facilitate scholarship and discovery of new knowledge.

Case-based small group learning sessions help connect research approaches and findings to medical practice. For example, students are encouraged to access the PubMed resource, OMIM (Mendelian Inheritance in Man)--an outcome of the Humane Genome Project--to garner information about the genetic bases of diseases encountered in cases. Case-based exercises are structured to allow time for both

'brainstorming' and access to Web-based digital information to solve problems. Small group facilitators encourage critical thinking, effective communication, team building and respectful professional behavior.

6. Educational environment will be appropriate to the mission of the medical school and students are educated in the biopsychosocial model.

Situations uniquely associated with disadvantaged, rural and geriatric populations are specifically addressed in both lecture and small group sessions. Some examples of issues addressed include neurodegenerative disease (early and normal onset Alzheimer's disease), metabolic syndrome and diabetes, alcoholism, starvation, poor nutrition in geriatric populations, and chronic disease leading to disabilities.

SYLLABUS CHANGE POLICY:

This syllabus is a guide for the course and is subject to change with advanced notice.