UNIVERSITY OF LOUISVILLE

SCHOOL OF DENTISTRY

DEPARTMENT OF MICROBIOLOGY and IMMUNOLOGY

MICROBIOLOGY and IMMUNOLOGY FOR DENTAL STUDENTS

BMSC 806 Summer 2009

May 11 - July 2, 2009

Monday, Tuesday & Thursday, 8:00 AM - noon

Room C-126 (except for exams in HSC Auditorium)

Required Textbook:	Essentials of Microbiology for Dental Students J. Bagg, T. W. MacFarlane, I. R. Poxton, C. & A. J. Smith 2nd Ed. 2006, Oxford Press (HSC bookstore; 2 copies on reserve in library)
Lecture Handouts:	provided in individual sections, with handouts for Immunology section (May 11– 21) distributed in mailbox prior to beginning of course

Department of Microbiology and Immunology
Summer 2009

1a. Description:

It is necessary for dentists to possess a knowledge of the infectious disease process, and the response of the human body to challenge by an infectious agent. The practice of dentistry entails occupational hazards, particularly from microbial pathogens. Bacteria such as *Mycobacterium tuberculosis* and viruses such as hepatitis B and herpes simplex virus have have been recognized as significant occupational infectious hazards for a number of decades. In contemporary dentistry, the AIDS virus, HIV-1, and hepatitis C virus pose additional challenges with respect to blood-borne infectious agents, while the threat of hepatitis B virus is being reduced in significance because of the development of a safe and effective vaccine and its current use in routine childhood immunization.

In addition, there are a number of generally less severe pathogens which can be easily transmitted as contagious agents via the respiratory route or fecal-oral route between staff and patients in your dental practice if proper hygiene and infection control are not routinely practiced. Dentists should also have an up-to-date and accurate knowledge of the major role of vaccines and immunization as one of the most cost-efficient tools in modern public health and preventative medicine – dentists can serve as highly effective educators with their patient population concerning both childhood immunization and important annual immunization of "at-risk" adults with influenza viral and pneumococcal bacterial vaccines.

In this course, infectious disease as an occupational hazard will be emphasized. Fundamental aspects of microbial physiology, and characteristics of microbial pathogens will be presented. The emerging knowledge on the role of infectious agents in dental caries and periodontal disease will also be emphasized. Upon completion of the course, the student should have acquired the knowledge to read and understand all aspects of the contemporary dental microbiology and immunology literature.

1b. The goals of the course include:

a. Emphasize infectious diseases as an occupational hazard for dentists

b. Introduce the student to all major human pathogens, particularly those found in North America and those that may be encountered in foreign travel

c. Introduce the student to characteristics of oral pathogens

d. Provide the student a background in bacterial physiology, molecular biology and anti-microbial mechanisms

e. Provide the student an introduction to all common human vaccines, including composition & recommended use

f. Characterize for the student the essential features of the human immune system, emphasizing oral immunity

1c. Core Competencies for DMBPre-Doctoral curriculum (28 August 2008) addressed in this course examinations & homework:

2.1 Apply critical thinking and problem solving skills in the comprehensive care of patients.

3.1 Comply with federal, state, and local regulations related to infection control, radiation and environmental safety measures in all clinical procedures ***--- especially those related to infection control, including blood-borne infectious agents and contagious infectious agents transmitted by***

respiratory or fecal-oral routes

4.3 Perform a clinical examination of the head and neck and intraoral structures ***--- especially lesions or signs of inflammation due to infectious agents***

4.5 Obtain other relevant diagnostic information such as laboratory tests and medical consultations when appropriate ***--- especially laboratory tests for immunological function or infectious agents***

4.7 Recognize predisposing and etiologic factors that require intervention to prevent disease ***---- especially immunodeficiencies, hypersensitivities, or risk factors for infective endocarditis which require prophylactic antibiotics***

4.8 Interpret findings from the history, clinical and radiographic examinations, and other diagnostic procedures.

4.9 Recognize the manifestations of systemic disease and how the disease and its management may affect the delivery of dental care ***---- such as chronic viral infections with HIV, hepatitis B or C viruses, or medical conditions which may place the patient at risk of bacterial endocarditis***

5.2 Discuss etiologies, prognoses, and preventive strategies with the patient; educate the patient so he/she can participate in the management of his/her own oral health care -- ***especially bacterial agents responsible for plaque and periodontal disease***

6.5 Diagnose and manage (refer or treat) patients with periodontal disease ***--- using knowledge of the bacterial etiology and relevant diagnostic techniques and appropriate anti-bacterial therapies***

6.10 Diagnose and manage patients with oral mucosal and osseous disorders disorders ***----- especially those related to infectious agents and/or immunodeficiences***

6.13 Select and administer/prescribe appropriate pharmacological agents in the treatment of patients with dental disease ***---- especially antibiotics and other antimicrobial compounds and solutions, and penciclovir for recurrent herpes labialis***

6.16 Recognize and manage medical emergencies that may occur in dental practice ***especially drug allergies which may result in anaphylaxis***

2. <u>Attendance at lectures and videos</u>:

Class attendance is mandatory, and accounts for a portion of the course grade (see discussion below **of "5.5% credit"**). If a student must miss a class period it is his/her responsibility to notify Student Affairs Office on a timely basis. Student Affairs will then forward the reason for the absence to the Course Director. In **the case of valid reasons for an absence**, the Course Director may allow a student the opportunity for makeup credit for missed videos. Even with valid excuses, the student is responsible for all of the information covered in lectures., and may need to consult with classmates.

Any student who is not in compliance with the <u>Immunization Requirements</u> for DMD students will not be allowed to attend class and receive any of the "5.5%" credit nor take Exams --- it would be hypocritical and unprofessional to allow participation in a microbiology and immunology course when not in full compliance with immunization requirements.

3. <u>Required reading assignments in textbook</u>:

In some cases, instructors may provide specific pages and/or chapters for their specific lectures, or may leave to the student the responsibility of reading relevant pages in the textbook. There will be several "self-study" written homework assignments included in the "5.5% credit" which will require specific, assigned

reading in the textbook. Students are also responsible for material in handouts prepared by the lecturers. In most cases, instructors in this course will personally assist any student with specific items in lectures given by that lecturer. The student should be aware that the instructors are willing to go to extraordinary lengths to provide instruction and assistance.

4. **Grading system:** In the past, students have generally been highly successful in this course, because of the favorable student response to the rigorous course demands. 2001 was the first year that this course was taught in a short time-frame in the late spring/early summer (May-July 2001) versus previously being taught as a full-semester fall course, and high-level performance continued because of dedication of students in attending all lectures and reading/studying throughout the course. The grading system has been tested for several years and found to be acceptable to students and faculty. The grading scale is outlined below. +/-grades and Honors were added in 2004, along with deletion of D grade.

H (Honors)	4.0 GPA	Top 10% of class (rounded to nearest whole student)
A	4.0 GPA	≥ 90.00 % - < Honors
A-	3.7 GPA	87.00 – 89.99 %
B+	3.3 GPA	84.00 – 86.99 %
B	3.0 GPA	80.00 – 83.99 %
B-	2.7 GPA	77.00 – 79.99 %
C+	2.3 GPA	74.00 – 76.99 %
C	2.0 GPA	70.00 – 73.99 %
F	0.0 GPA	less than 69.99 %

A grade lower than 60 of possible 100 questions on the Final Exam will also be considered as an F for the course, unless the overall average at the end of the course is at least 75.00%. It is emphasized the fractions will not be rounded off to the nearest number. Subjective judgments will NOT be made, although the Course Director has the option of making very minor adjustments downward in the required % performance for each letter grade and the overall course average % needed to avoid the "minimum of 60 of 100" rule. Credit for correctly answered questions on the **three regular exams on different subject areas (total of 200 questions) and the final comprehensive exam (total of 100 questions) will count for 94.5% of the total grade**, and the **remaining 5.5% credit is available from completion of self-study homework assignments (~1.1%) and attendance at lectures and videos (~4.4%), with sign-in time during the 8:00 AM – 11:50 AM period at the discretion of the course director.**

Each question on a regular exam and final exam will have equal weight **(300 total questions**; **0.315% of total course credit for each correctly answered question**, for 94.50% total). There will be approximately 3-4 questions per lecture plus a limited number of questions on supplemental material (videos, self-study assignments) on Exams I – III.. There will **be 65 questions on Exam I (Immunology), 79 questions on Exam II (Bacteriology, Mycology & Parasitology)** , **56 questions on Exam III (Virology**), and **100 questions on the comprehensive Final Exam**. Copies of a past comparable Exams I, II and III will be available in the copycenter, so that students can get a good idea of the type of questions and levels of content.

All four of the exams will be multiple choice, single-best-answer, and will be scanned/computer graded. Students will not be able to keep their written examinations following completion, because many questions may be reused in subsequent years in an identical or modified fashion. Following the completion and grading of each examination, students will be able to access their individual scores on exams using the Blackboard Website. All students performing at a failing level will be notified in writing and/or by e-mail. The Dental Student Affairs Office will also be notified of any failing grade earned on each examination. Students exhibiting marginal performance are encouraged to seek tutoring arranged by the Dental Student Affairs Office.

Students will NOT be able to review their exams ----- the extremely short time-frame for this course does allow adequate time for individual, monitored review of exams by students, and a scheduled group review open to the entire class in past years had led to virtual reproduction of exam questions and content, so that exam

questions could not be used in subsequent years.

In past years, the final grades for this "summer" course have been:

	H	A	A-	B+	B	B-	C+	C	D	F
2001		29			30			20	0	0
2002		25			38			16	0	0
2003		25			37			15	2	0
2004	8	14	12	14	15	6	6	3	-	1
2005	8	9	15	13	12	10	3	5	-	0**
2006	8	14	5	16	14	7	12	2	-	0**
2007	8	3	16	11	20	11	8	4	-	0**
2008	8	8	14	15	11	11	5	8	-	2**

several students with F at end of course remediated this failure by improved performance on a make-up Final Exam, as described below in **Remediation.

During the examination periods, using cell phones or other electronic devices, talking, glancing or looking at another student's exam constitute unacceptable behavior and a violation of the Code of Professional Responsibililty. In addition, all backpacks, book bags and other personal items should be placed outside the examination area --- if any of these items are brought into the examination room, they must be placed up on the stage until completion of the examination. Those who are more than 15 minutes late for an examination without prior approval may be required to take an oral examination make-up, if Dr. Crim excuses the tardiness. If a student fails to turn in her/his exam or computer-graded answer sheet to the instructor/proctor/departmental representative following the allotted examination time frame, an automatic zero will be awarded the student.

5. Remediation for students with failing grade: Students with an F at the end of the course in early July, either because of an overall score of less than 70.00% or an overall score of less than 75.00% along with a Final Exam score of 59 or less, will be able to remediate the failing grade by self-study during the summer and taking a make-up, 100 question comprehensive Final Exam sometime after mid-August. The score on this makeup exam will replace the score for the Final Exam taken in early July, and will be used to determine a new letter grade. Failing students whose score is still F after this makeup Final Exam will need to remediate by taking the entire course from mid-May through early July of the following year.

6. Course Coordinator: Lawrence A. Hunt, Ph.D. 852-5361 lahunt01@louisville.edu

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7. Course schedule – separate 3 pages

(revised 28 April 2009)

University of Louisville
Dental Microbiology and Immunology (BMSC 806)
Summer 2009 (May 11 – July 2)

Monday, Tuesday & Thursday, 8:00 AM – Noon, Room C-126
(Examinations in HSC Auditorium unless indicated)

Date	Topic	Lecturer
11 May, Monday	Introduction to dental microbiology/immunology	Hunt
	Natural/innate immunity	Hajishengallis
	Inflammation	Hajishengallis
	Inflammation	Hajishengallis
12 May, Tuesday	Acquired/specific immunity	Hunt
	Antibody/antigen structures & interactions	Hunt
	Video: "The Immune System"	
	Antibody isotypes & effector functions	Hunt
14 May, Thursday	Maturation/selection of B cells precursors & Ig genes	Hunt
	Complement system; cytokines & receptors	Hunt
	Video: "B cells & immunoglobulin genes"	
	HLA: human major histocompatibility complex	Hunt
18 May, Monday	Protein antigen processing & presentation by MHC/HLA	Hunt
	Maturation/selection of T cell precursors & TCR genes	Hunt
	Video: "Cellular mechanisms of the immune response"	
	Activation, differentiation & effector functions of T cells and NK cells	Hunt
19 May, Tuesday	Activation and differentiation of B cells	Hunt
	Hypersensitivities type I - IV	Martin
	Autoimmunity	Martin
	Self-Study: review article on autoimmunity	
21 May, Thursday	Genetic & acquired immunodeficiencies	Hunt
	Video: Complement	
	Review for Exam I	*Hunt*
25 May, Monday	***Memorial Day Holiday***	
26 May, Tuesday	**Exam I - Immunology (Auditorium, 9:00 - 10:30 AM)**	
[11:00AM]	Bacterial ultrastructure & taxonomy	Hunt

Date	Topic	Lecturer
28 May, Thursday	Bacterial cell wall & envelope: structure & function	Hunt
	Bacterial growth & physiology	Hunt
	Video: urinary tract & enteric infection; endocarditis	
	Bacterial genetics & molecular biology	Hunt
1 June, Monday	Antimicrobial agents: structures & mechanisms of action	Hunt
	Clinical use of antibiotics	Hunt
	Video: Vaccines: Separating Fact from Fear	
	Mycology: fungal structure & growth	Hunt
	Self-study: Sterilization & disinfection; infection control	
2 June, Tuesday	Oral candidiasis: *C. albicans* & other *Candida* spp.	Hunt
	Mucocutaneous, systemic & respiratory mycoses	Hunt
	Normal microbiota, virulence mechanisms	Miller
	Staphylococci	Miller
4 June, Thursday	β-hemolytic Streptococci	Miller
	Streptococcus pneumoniae	Miller
	Video: Superbugs - when antibiotics don't work	
	Syphilis & sexually-transmitted bacterial diseases	Miller
8 June, Monday	*Neisseria, Haemophilus, Bordetella*	Miller
	E. coli and other gram-negative enterics	Miller
	Pseudomonas, *Legionella*, water microbes	Miller
	Dental unit waterline biofilms	Staat
	Self-study: bacterial agents of infective endocarditis and antibiotic prophylaxis/therapy	
9 June, Tuesday	Porphyromonas gingivalis & other periodontal pathogens	Staat
	Mutans streptococci & other agents of dental caries	Staat
	Gram-positive rods	Staat
	Mycobacteria, including *M. tuberculosis*	Staat
	Self-studies: Oral bacteria, caries, gingivitis & periodontitis	
11 June, Thursday	Parasitology: overview & oral parasites	Hunt
	Protozoa, including *Plasmodium* (malaria) & intestinal	Hunt
	Helminths, including *Trichinella &, Enterobius* (pinworm)	Hunt
	Review for Exam II (Bacteriol., Parasitol. & Mycology)	*Hunt*
15 June, Monday	**Exam II - Bacteriology, Parasitology & Mycology (8:30 - 10:30 AM)**	
[11:00AM]	Nature of human viruses: structure & properties	Hunt
16 June, Tuesday	Virus-cell interactions & cell culture for virus replication	Hunt
	How viruses replicate in human cells	Hunt
	Video: Poliovirus & poliovirus vaccines	
	Antiviral agents & interferon	Hunt

Date	Topic	Lecturer
18 June, Thursday	Viral immunology & human viral vaccines	Hunt
	How human viruses are transmitted & cause disease	Hunt
	Video: HIV and AIDS	
	Human Retroviruses: HIV & HTLV	Hunt
22 June, Monday	HIV & AIDS, prevention & therapies	Hunt
	Paramyxo, corona & rhino: respiratory viruses	Hunt
	Video: Influenza pandemic of 1918	
	Human influenza viruses & vaccines	Hunt
23 June, Tuesday	Human viruses transmitted by fecal-oral route	Hunt
	Infections & diseases of human herpesviruses	Hunt
	Video: "Hepatitis B vaccine trial"	
	Human infections & disease from zoonotic RNA viruses	Hunt
25 June, Thursday	Adeno, papilloma, pox & parvoviral diseases	Hunt
	Human hepatitis viruses	Hunt
	Video: "Prions, vCJD & BSE"	
	Human vaccines & immunization	Hunt
29 June, Monday	**Exam III - Virology (10:00 - 11:30 AM; HB202 & HB302)**	
2 July, Thursday	**Final Exam (9:00AM – noon)**	

Required Textbook: Bagg, J., T.W. MacFarlane, I.R. Poxton and A.J. Smith,
Essentials of Microbiology for Dental Students 2nd Edition,
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