



## MEMORANDUM

**TO:** Dr. Praveen Sekhar, Chair, Academic Affairs Committee  
**FROM:** Michael Griswold, Director, School of Molecular Biosciences, College of Veterinary Medicine  
Patrick Carter, Director, School of Biological Sciences, College of Arts and Sciences  
**RE:** (Item #2023.01.12\_274\_AAC) Proposal to Create a Bachelor of Science Degree in Pharmaceutical and Medical Sciences (Exhibit [274A](#) [274B](#) [274C](#)). -D. Drigar / K. Meier  
**DATE:** February 13, 2023

***The communications below were received by the Academic Affairs Committee regarding the pending proposal to create a Bachelor of Science Degree in Pharmaceutical and Medical Sciences.***

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The School of Molecular Biosciences (SMB) in the College of Veterinary Medicine and the School of Biological Sciences (SBS) in the College of Arts and Sciences have concerns over the proposal listed above. The primary concerns include the following:

1. The goals as listed in the proposal are competitive with SMB degrees in Microbiology, Genetics and Cell Biology, and Biochemistry. Our courses already offer experience in analyzing biomedical literature, discussion of ethical considerations and examination of challenges and controversies in biology. The overlap in course work in SMB in the last two years is extensive. The argument that these new courses would be different because they are human focused is weak since the biological principles are the same for all organisms and our courses also use human examples. Even if some lectures are different the overall goal and learning goals of the SMB degrees and the proposed program are the same i.e. preparing students for a doctorate or professional career in biomedical sciences. On page 7 of the Curriculum Handbook from the WSU Office of the Registrar, it states, "Prior to submission of a request for a new course, the department is charged with verifying that the new course is substantially different from any existing course and communicating with other departments that may have related courses." See addendum for comparison and evidence of syllabi from the courses with significant overlap. During the 2020 Spring semester, faculty from SBS and SMB met with faculty from the College of Pharmacy and voiced their opposition to the creation of their overlapping degree program. That was the last time there was discussion among the units on this topic.
2. Students choosing a BS in Pharmaceutical and Medical Sciences will have detrimental effects on enrollments and credit hours for SBS, SMB and other life science units in Pullman. For example, under the proposed 2 and 2 plan, SBS would lose a significant fraction of upper-



division credit hours currently taken by our pre-Med and pre-Pharm majors. The proposal claims that their objective is to provide a pathway for place bound graduates of the Community Colleges of Spokane (CCS). They provide data that CCS graduates 1000 students per year, but the AA/AS degree requirements listed in the proposal include extensive coursework in chemistry, physics and biology and there is no evidence to suggest that many students will satisfy those requirements and of those that do there is no data as to how many are truly place bound. We question the size of their target group, and they will not confine entry into the program to CCS graduates. In order to be successful, they will surely draw from Life Science programs on the Pullman campus.

3. Our programs have extensive experience and success in training students for doctoral study and for professional programs and we are concerned that the proposed degree would convey the wrong message. Students and parents could think that there would be an advantage if they have career interests in the pharmaceutical and medical sciences, and/or that earning such a degree puts them on a fast track for being accepted into Professional schools on the Spokane campus. In our experience there is no evidence that either of those things are true, so the potential attractiveness of this degree is built on a misrepresentation. In addition, students are much better off in Pullman where they can utilize the Health Profession Student Center to truly help them prepare for careers in the health sciences. No such infrastructure exists on the Spokane campus. In general, Professional Colleges isolated from the main campus are particularly ill-equipped to offer undergraduate classes; they don't have the expertise or the infrastructure for it and they are completely lacking the disciplinary breadth that should be available to all undergraduate students throughout their education.
4. There are several errors in the proposal. The transfer equivalencies table on page 11 is incorrect with respect to Biol transfer classes (and may be incorrect for the organic Chem classes). The equivalency for Biol 106 from Spokane Falls and Spokane CC is incorrect: it should be Biol&221 and Biol&223, not just Biol&223. Biol&223 is insufficient for Biol 106. There are NO equivalencies for Biol 315 and Biol 353 from any community college, and that has been WSU and SBS policy for many years. Their statement about these equivalencies is completely incorrect. There is reference in the "impact statement" about the STARS program in CVM. This reference indicates a misunderstanding of the STARS program which is a select program involving limited numbers of students. Our concern is with the potential impact on our three undergraduate degrees.
5. The School of Biological Sciences offers a BS in Biology-General Option through the WSU Global campus. Place-bound students in the state of Washington and other locations can earn a Bachelor of Science in Biology at their own pace and according to their employment and personal schedule without needing to leave home. In addition, SBS is expanding its Global offerings: SBS is in the process of developing the BS in Biology-Basic Medical Sciences Option for the WSU Global campus. We anticipate that this Biology degree option will be in place on the Global campus in the next 12 to 18 months. The BS in Biology-Basic Medical Sciences



Option is the program that we recommend to all students who are interested in entering a PharmD professional program upon completing their BS degree. Therefore, pre-Pharmacy students in the state of Washington will soon be able to pursue an undergraduate degree program tailored specifically to their needs via the WSU Global campus and can do so without leaving home or altering their personal or employment schedules.

Summary: Considering the issues described above, we respectfully ask that the Academic Affairs Committee re-evaluate this proposal. Certainly, the course overlap is significant. The proposed new degree is academically and functionally like existing degrees offered in SMB that are predoctoral and preprofessional degrees in biomedical sciences. The global degree to be offered by SBS has an overlapping function with place-bound students. The proposed new degree will have the potential to draw students away from existing degree programs on the Pullman campus and redistribute enrollment rather than to increase overall enrollment. It is our view that this proposal is an attempt by professional colleges on the Spokane campus to increase their revenues at the detriment of the Pullman campus, WSU students, and their families. This proposal also underscores the issue of new undergraduate degrees on urban campuses. There should be policies in place as to how these degrees are reviewed such that campuses work together and not in competition.

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To: Dr. Pravaeen Sekhar, Chair, Academic Affairs Committee

From:  
School of Molecular Biosciences, College of Veterinary Medicine

RE:(Item #2023.01.12\_274\_AAC) Proposal to Create a Bachelor of Science Degree in Pharmaceutical and Medical Sciences (Exhibit [274A](#) [274B](#) [274C](#)). -D. Drigar / K. Meier

The School of Molecular Biosciences has reviewed the proposal named above that is under consideration by the Faculty Senate. We find that this program duplicates Bachelor of Science degrees in our college, namely Microbiology, Biochemistry, and Genetics and Cell Biology. We have compared syllabi from eight of the courses in the proposed degree with syllabi in our degrees, all of which have the MBIOS designation. We request that the Academic Affairs Committee more closely review the syllabi from these degree programs and reconsider the approval of this new degree that has significant overlap with already existing degrees.

Below, we provide evidence from the syllabi of the courses that exhibit significant overlap:



TMP 350 Introduction to medical biochemistry AND MBIOS 303 Introductory Biochemistry

Excerpts from TMP 350:

The course contains six major components. Mastery of each of these components is critical to understand medical biochemistry. These components relate to each other, and one is not any more important than the next. In addition, the order these can be taught is independent of comprehension of the subject. The six modules are as follows:

1. Protein Structure and Function
2. Storage and Expression of Genetic Information
3. Bioenergetics and Carbohydrate Metabolism
4. Lipid Metabolism
5. Nitrogen Metabolism
6. Integration of Metabolism

Excerpts from MBIOS 303:

1/17	2	T	Amino acids, peptides, and proteins	3.1, 3.2, 3.3	
1/19		Th	Protein 3D structure	4.1-4.4	
1/24	3	T	Protein function - Hemoglobin	5.1	
1/26		Th	Protein function	5.2, 5.3	
1/31	4	T	Enzymes	6.1, 6.2	
2/2		Th	Enzymes	6.4, 6.5	
2/7	5	T	<b>Exam 1</b>		
2/9		Th	Carbohydrates	7.1-7.3	
2/14	6	T	Nucleic acids	8.1-8.3	
2/16		Th	Lipids and membranes	10.1, 10.2	
2/21	7	T	Transport	11.1-11.3	
2/23		Th	General signal transduction	12.1, 12.2	
2/28	8	T	Introduction to metabolism	1.2, 1.3, 13.1, 13.2	
3/2		Th	Introduction to metabolism	13.3-13.5	

TMP 350 Introduction to medical biochemistry AND MBIOS 413 General Biochemistry I

Excerpts from TMP 350:

The course contains six major components. Mastery of each of these components is critical to understand medical biochemistry. These components relate to each other, and one is not any more important than the next. In addition, the order these can be taught is independent of comprehension of the subject. The six modules are as follows:

1. Protein Structure and Function
2. Storage and Expression of Genetic Information
3. Bioenergetics and Carbohydrate Metabolism
4. Lipid Metabolism
5. Nitrogen Metabolism
6. Integration of Metabolism



Excerpts from MBIOS 413:

	1 Sept	Amino acids <b>QUIZ #1</b>	Pg. 75 & Ch 3.1
	3 Sept	Amino acids & 1 <sup>o</sup> protein structure	Ch 3.1, 3.2, 3.4; pg. 1110-11 & 228-9
3	6 Sept	<b>NO CLASS – Labor Day</b>	
	8 Sept	2 <sup>o</sup> protein structure <b>QUIZ #2</b>	Ch 4.2
	10 Sept	2 <sup>o</sup> protein structure	Ch 4.2

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General Biochemistry I

Fall 2021

4	13 Sept	3 <sup>o</sup> protein structure	Ch 4.3; pg 130-143
	15 Sept	3 <sup>o</sup> and 4 <sup>o</sup> protein structure <b>QUIZ #3</b>	Ch 4.3; pg 130-143
	17 Sept	4 <sup>o</sup> protein structure	Ch 4.3; pg 130-143
5	20 Sept	Protein folding and stability	Ch 4.4
	22 Sept	Protein folding and stability	Ch 4.4
	24 Sept	<b>EXAM #1</b>	
6	27 Sept	Protein function: ligand binding	Ch 5.1, 5.2
	29 Sept	Protein function: myoglobin/hemoglobin	Ch 5.1
	1 Oct	Working with proteins (overview of methods)	Ch 3.3, Fig 4-10, Box 4-5
7	4 Oct	Introduction to enzymes	Ch 6.1, 6.2
	6 Oct	Catalytic players and types of reactions <b>QUIZ #4</b>	Ch 6.2, 13.2
	8 Oct	Michaelis-Menten Kinetics	Ch 6.3, pg 201-4
8	11 Oct	Michaelis-Menten Kinetics	Ch 6.3, pg 201-4
	13 Oct	Enzyme Inhibition <b>QUIZ #5</b>	Ch 6.3, pg 204-7
	15 Oct	Enzyme Inhibition	Ch 6.3, pg 204-7
9	18 Oct	Enzyme inhibition and mechanisms	Ch 6.3, 6.4
	20 Oct	Enzyme Mechanisms <b>QUIZ #6</b>	Ch 6.4
	22 Oct	Enzyme Mechanisms	Ch 6.4
10	25 Oct	Allosteric & cooperativity	Ch 6.5
	27 Oct	Allosteric & cooperativity	Ch 6.5
	29 Oct	<b>EXAM #2</b>	
11	1 Nov	Structures of lipids and membranes	Ch 11.1, 11.2
	3 Nov	Membrane dynamics and membrane proteins	Ch 11.2
	5 Nov	Membrane function: transport	Ch 11.3
12	8 Nov	Carbohydrates	Ch 7.1-7.4
	10 Nov	Carbohydrates <b>QUIZ #7</b>	Ch 13.3, 13.4

TMP 350 Introduction to medical biochemistry AND MBIOS 414 General Biochemistry II

Excerpts from TMP 350:

The course contains six major components. Mastery of each of these components is critical to understand medical biochemistry. These components relate to each other, and one is not any more important than the next. In addition, the order these can be taught is independent of comprehension of the subject. The six modules are as follows:

1. Protein Structure and Function
2. Storage and Expression of Genetic Information
3. Bioenergetics and Carbohydrate Metabolism
4. Lipid Metabolism
5. Nitrogen Metabolism
6. Integration of Metabolism





Excerpts from MBSIO 414:

6	14 Feb	Integration of carbohydrate metabolism, glyoxylate cycle	20.7
	16 Feb	Integration and Regulation of Mammalian Metabolism	20.8
	18 Feb	<b>EXAM #1</b>	
7	21 Feb	<b>NO CLASS – Presidents Day</b>	
	23 Feb	Fatty Acid Metabolism: Intro, transport and storage	17.1
	25 Feb	Fatty Acid Metabolism: beta oxidation	17.2-17.3
8	28 Feb	Fatty Acid Metabolism: ketone bodies	17.3
	2 Mar	Lipid Metabolism: Biosynthesis of fatty acids and eicosanoids <b>QUIZ #5</b>	21.1, 21.2
	4 Mar	Lipid Metabolism: Biosynthesis of triacyl glycerides	21.3
9	7 Mar	Lipid Metabolism	21.3, 21.4
	9 Mar	Lipid Metabolism: Cholesterol Biosynthesis of cholesterol <b>QUIZ #6</b>	21.4
	11 Mar	Lipid Biosynthesis and Fatty Acid Oxidation Integration	
<b>Spring Break March 14 – 18 No Classes</b>			
10	21 Mar	Amino Acid Metabolism: Introduction	Ch. 18.1
	23 Mar	Amino Acid Metabolism: Catabolism	Ch. 18.3
	25 Mar	<b>EXAM #2</b>	Ch. 18.3
11	28 Mar	Amino Acid Metabolism: Biosynthetic pathways	Ch. 22.2
	30 Mar	Amino Acid Metabolism: Biosynthetic pathways	Ch. 22.3
	1 Apr	Integration of carbo, fatty acid, and amino acid metabolism	Chs. 14-17, 18.1, 18.3, 19-21, 22.2-3
12	4 Apr	Nitrogen Metabolism: Overview and urea cycle	Ch. 18.2, 22.1
	6 Apr	Nitrogen metabolism <b>QUIZ #7</b>	Ch. 18.2, 22.1
	8 Apr	Nitrogen metabolism	Ch. 18.2, 22.1
13	11 Apr	Nucleotide metabolism	Ch. 22.4
	13 Apr	Nucleotide metabolism <b>QUIZ #8</b>	Ch. 22.4
	15 Apr	Nucleotide metabolism	Ch. 22.4
14	18 Apr	Nucleotide metabolism	Ch. 22.4
	20 Apr	Metabolic Regulation: Applications <b>QUIZ #9</b>	Chs. 14 – 23
	22 Apr	Metabolic Regulation: Applications	Chs. 14 – 23
15	25 Apr	Metabolic Regulation: Applications	Chs. 14 – 23

PharMedS 323 Ethics: conduct and career development AND MBIOS 138 Molecular Biosciences Seminar

Excerpts from PharMedS 323:

The major goals of this course are:

- 1) To introduce students to “soft skills” needed to participate in a research project.
- 2) To provide students with basic skills in scientific and professional writing.
- 3) To give an overview of issues relevant to responsible conduct of research.
- 4) To provide a forum for the discussion of historical and current issues in biomedical ethics.

Excerpts from MBIOS 138:



Goals

- 1. Students will familiarize themselves with resources on campus which will increase their likelihood of academic success.
2. Students will realize the importance of ethical practice in scientific research.
3. Students will understand and develop professionalism appropriate to studying and working in STEM fields.
4. Students will learn about and practice successful resume and cover letter writing, as well as develop effective personal statements for post-graduate programs.
5. Students will be able to identify the research interests of multiple faculty in the College of Veterinary Medicine, and understand how the research carried out makes impacts in areas such as human and animal health, and technological innovation.
6. Students will be exposed to and understand the value of extra-curricular activities such as internships, clubs, research, and study abroad.
7. Students will improve their critical thinking skills.

Course Objectives

Learning Outcomes Grid [COMM]. Complete and submit with other required materials.

Table with 5 columns: WSU/UCORE Learning Goal, COMM Category Learning Outcomes, Course-level Learning Outcomes, Class Topics & Learning Activities, Learning Outcome Assessed by... Rows include Communication, Critical & Creative Thinking, Information Literacy, and Writing Requirement.

PharMedS 315 [COMM] Biomedical literature: communicating science AND MBIOS 201 [COMM] Introduction to communication in the molecular life sciences Excerpts from PharMedS 315:

Excerpts from MBIOS 201:



Course Goals and Learning Objectives

In the life sciences, the discovery of new knowledge and the development of new paradigms occur on a very rapid timeline. Keeping up with new developments and paradigms requires students to go beyond their textbooks and class materials and into the primary and popular literature. It is the experience of the faculty members in both the School of Molecular Biosciences and in the Neuroscience Program that many students, including some in their senior year of their academic program, do not have the opportunity to develop and practice the skills needed to read and interpret scientific communication. Therefore, the first goal of MBioS/Neurosci 201 is to teach students in Molecular Bioscience and Neuroscience majors how to engage with primary literature. We will use a peer-reviewed teaching method known as CREATE (Consider, Read, Elucidate hypotheses, Analyze and interpret data, and Think of the next Experiment; Hoskins, SG (2008), Journal of Undergraduate Neuroscience Education, Vol. 6(2), pp. 40-52). This established method provides training such that students can read and interpret primary literature.

However, a well-trained scientist cannot simply read and understand the primary literature. They must also be able to communicate these scientific findings to broader audiences. The UK Chief Scientific Advisor Mark Walport has famously said, "Science isn't finished until it's communicated. The communication to wider audiences is part of the job of being a scientist, and so how you communicate is absolutely vital." Thus, the second course goal is to provide a mentored program that will teach you how to communicate knowledge about science to a variety of audiences (such as other scientists, medical professionals, and members of the public like teachers, students, or politicians) in a variety of formats (written, oral, visual, etc.).

Both of these course goals will combine to help students achieve the following Student Learning Objectives:

- 1. Students will build and use a toolbox of strategies for interpreting and communicating science in a variety of formats.
2. Students will develop skills for critically analyzing science communication for content, credibility, and quality of presentation.
3. Students will develop an awareness of the ethical and legal aspects of science communication.
4. Students will use evidence to make a claim.

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PharMedS 330 Molecular methods: biomedical techniques AND MBIOS 304 Microbiology and Molecular Biology Laboratory Excerpts from PharMedS 330:

Excerpts from MBIOS 304:

Course Objectives

The major goals of this course are to:

- 1) Familiarize students with the types of molecular methods used in biomedical research.
2) Enable students to interpret published data figures using various techniques.
3) Provide a basic understanding of the reasons why a particular technique is used, and its advantages and limitations.

Student Learning Outcomes

Table with 3 columns: At the end of this course, students should be able to; The following topic(s)/dates(s) will address this outcome; This outcome will be evaluated primarily by. Rows include outcomes like 'Explain how the presented techniques are commonly used in biomedical research studies' and 'Identify techniques that can generally be performed in any laboratory...'.





**Student Learning Objectives**

<b>Student Learning Outcomes</b> At the end of this course, students should be able to:	<b>Course Topics/Dates</b> The following topic(s)/dates(s) will address this outcome:	<b>Evaluation of Outcome-</b> This outcome will be evaluated primarily by:
Define and understand basic terms and concepts in microbiology, molecular biology, and biochemistry <b>SMB-A</b>	Covered in Monday lectures and reinforced in laboratory during the following week.	Pre-lab write ups, quizzes, and exams.
Successfully perform common lab experiments. Critically analyze the data generated. <b>SMB- C,D</b>	Staining, differential and selective medias, metabolic activities of bacteria, bacterial enzymes. Transformation, plasmid isolation, restriction digestion, PCR, CRISPR gene editing, protein purification, enzyme activity.	Post-lab write ups.
Students will demonstrate the ability to follow protocols (SOPs) and use equipment commonly found in a microbiology/molecular biology/biochemistry lab. <b>SMB- C,D</b>	During lab periods throughout the whole semester	Post-lab write ups.
Demonstrate scientific writing skills. Students will write clear, appropriate post-lab	During lab periods throughout the whole semester.	Post-lab write ups.

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reports, accurately communicating the significance of their results. <b>SMB- B, E, and F</b>		
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**SMB Student learning outcomes**

- A. Synthesize the modern foundational knowledge underlying Microbiology (biochemistry, cell biology, and genetics).
- B. Demonstrate relevant ethical concepts related to scientific publication and research conduct.
- C. Apply the basic laboratory techniques used in molecular bioscience research.
- D. Design, perform, and quantitatively/qualitatively evaluate the results of laboratory experiments
- E. Locate, retrieve, and evaluate scientific information, especially primary literature, with regards to its adequacy, value, and logic.
- F. Prepare oral and written reports in standard scientific formats.



PharMedS 330 Molecular methods: biomedical techniques AND MBIOS 402 [M] Genetics  
Laboratory

Excerpts from PharMedS 330:

**Topic Outline**

Lecture	Topic:	Instructor- TBD
1	Course overview	
2	Working with DNA and RNA	
3	Polymerase chain reaction	
4	Gel electrophoresis of DNA	
5	Sanger sequencing	
6	Next generation sequencing	
7	Non-coding DNA	
8	Bacterial expression systems	

Updated 1.12.2022

Lecture	Topic:	Instructor- TBD
9	DNA cloning	
10	Mammalian expression systems	
11	CRISPR/Cas9 system	



Excerpts from MBIOS 402:

Week	Date	Topic	Assignment due Friday
1	M 9 Jan	Syllabus, Introduction CRISPR Cas9/DNA repair	Turn in MBioS 402 survey for 5 points.
	T 10 Jan	Lab safety, CRISPR Design	
	Th 12 Jan	CRISPR DESIGN (Zoom)	Due Friday Jan 13 -CRISPR design
2	M 16 Jan	MLK holiday, no lecture	
	T 17 Jan	Human Genetics, SNAP gene, PCR primer design activity- bring tablet or laptop to class- In class assignment for 5 points.	
	Th 19 Jan	Expt 1. DNA isolation from cheek cells, 1 <sup>st</sup> PCR, TAs will set up the 2 <sup>nd</sup> PCR	Due Jan 20 Human SNP and primer assignment (15 points)
3	M 23 Jan	How to write papers for 402. Discussion of Micropublication format.	

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Genetics Lab

Spring 2023

	T 24 Jan	Gel of PCR, PCR cleanup. TA sets up sequencing. Repeat DNA isolation and PCR if necessary.	
	Th 26 Jan	Repeat Gels, PCR clean up. TA send out sequencing.	Due January 27 Micropublication assignment (15 points).
4	M 30 Jan	CRISPR project overview	
	T 31 Jan	Ligate crRNA coding oligos into pML107; E. coli transformation	
	Th 2 Feb	Transformation results (Count colonies); mini-prep plasmid DNA; measure concentration; set up sequencing reactions	Due Feb 3 CRISPR design activity (15 points).
5	M 6 Feb	Interpreting human DNA sequencing results (Zoom).	



PharMedS 330 Molecular methods: biomedical techniques AND MBIOS 430 [M] Combined Immunology and Virology Laboratory

Excerpts from PharMedS 330:

23	Working with cells	
24	Cell culture of primary and established cells	
25	3D and organoid cultures	
26	Cell proliferation assays	
27	Cell cycle analysis	
28	Cell migration assays	
29	Methods for cell microscopy	
30	Confocal and immunofluorescence microscopy	
31	Cell transfections	
32	Virus-mediated gene delivery	
33	Knockdown using silencing RNAs	

Excerpts from MBIOS 430:

4	9/12	Hematology cont'd (2 of 3 wks): cell staining	Proposal-2: Methods & Assessment Plan; revision from feedback	TU 09/20
5	9/19	Hematology cont'd (3 of 3 wks): Blood typing; cells	(none)	(none)
6	9/26	Env bacteriophages, lytic & lysogenic cycles	Hematology Lab Report	TU 10/4
7	10/3	Tissue culture techniques and baculovirology (2wks)	Bacteriophage Lab report	TU 10/11
8	10/10	Tissue culture, cont'd; Responsible Conduct	Proposal-3: Background; revision from feedback	TU 10/18
9	10/17	Solid phase immunoassays (e.g. antigen/antibody)	(Canvas Discussion)	
10	10/24	Viral detection/other assays	(none)	(none)



PharMedS 401 Genomics: frontiers in human genetics AND MBIOS 423 Human genetics  
Excerpts from PharMedS 401:

**Topic Outline**

Lecture	Topic:	Instructor - TBD
1	Course overview	
2	Chromosomes and inheritance I	
3	Chromosomes and inheritance II	
4	Chromosomes and inheritance III	
5	Linkage, recombination, and gene mapping	
6	DNA structure, replication, and recombination	
7	<b>EXAM 1</b>	

Updated 1.14.2022

Lecture	Topic:	Instructor - TBD
8	Mutations	
9	Chromosomal rearrangements and ploidy	
10	Organelle inheritance	
11	Genome sequencing projects and genetic mapping	
12	Manipulating eukaryotic genomes	
13	Human gene therapy	
14	<b>EXAM 2</b>	
15	The new world of personal genomics	
16	Developmental genetics	
17	Population genetics	
18	Fundamentals of pharmacogenomics	
19	Techniques in pharmacogenomics	
20	Pharmacogenomics of drug metabolism	
21	Pharmacogenomics of cancer therapy	
22	<b>EXAM 3</b>	
23	Genome-wide association study (GWAS)	
24	Digital analysis of DNA I	
25	Digital analysis of DNA II	
26	Genome annotation	
27	Analyzing genomic variation I	
28	Analyzing genomic variation II	
29	Ethical aspects of pharmacogenomics	





Excerpts from MBIOS 423:

Lecture 1	Tu 1/10	Introduction/Genome Organization
Lecture 2	Th 1/12	Genome Organization
Lecture 3	Tu 1/17	Modes of Inheritance/gene mutations
Lecture 4	Th 1/19	Genetic mapping
Lecture 5	Tu 1/24	Genetic Mapping
Lecture 6	Th 1/26	Physical Mapping
	<b>Fri 1/27</b>	<b>Alternative Debate topic suggestions</b>
Lecture 7	Tu 1/31	Gene therapy
Lecture 8	Th 2/2	Stem Cells

\*\*\*\*\* **Tu 2/7** EXAM 1 (100 pts)

Lecture 9	Th 2/9	Huntington's Disease
Lecture 10	Tu 2/14	Cystic Fibrosis
Lecture 11	Th 2/16	X- Chromosome
Lecture 12	Tu 2/21	X-Chromosome DMD
Lecture 13	Th 2/23	X-Chromosome - Fragile X
Lecture 14	Tu 2/28	Y- Chromosome <b>(GPAP submissions)</b>
Lecture 15	Th 3/2	Sex reversal
Lecture 16	Tu 3/7	Sex reversal <b>(GPAP finalists announced)</b>

\*\*\*\*\* **Th 3/9** EXAM 2 (100pts)

**March 13 – 17 Spring Break**

Lecture 17	Tu 3/21	<b>Class Debate</b>
Lecture 18	Th 3/23	<b>Class Debate</b>
Lecture 19	Tu 3/28	Cancer Genetics
Lecture 20	Th 3/30	Cancer Genetics
Lecture 21	Tu 4/4	Tumor Suppressor Genes
Lecture 22	Th 4/6	Oncogenes
Lecture 23	Tu 4/11	Solid Tumors/ Breast Cancer
Lecture 24	Th 4/13	Non-solid Tumors/ Leukemia
Lecture 25	Tu 4/18	Cancer Treatments
Lecture 26	Th 4/20	Cancer Treatments
Lecture 27	Tu 4/25	Mitochondrial Genetics
Lecture 28	Th 4/27	Epigenetics/ Imprinting <b>GPAP performances</b>



PharMedS 421 [M] Scientific writing: writing and speaking AND MBIOS 494 [M] [CAPS] Senior project in molecular biosciences

Excerpts from PharMedS 421:

**Course Objectives**

The major goals of this course are:

- 1) To familiarize students with styles used in scientific and professional writing, in various types of documents.
- 2) To provide students with individual feedback on their writing so they can improve.
- 3) To provide students experience with an individual oral presentation in a professional scientific style.

**Student Learning Outcomes**

<b>At the end of this course, students should be able to:</b>	<b>The following topic(s)/dates(s) will address this outcome:</b>	<b>This outcome will be evaluated primarily by:</b>
Write scientific content in an appropriate professional or lay style.	Lectures 2-15	Writing assignments 1-5
Explain the purpose of various sections of a manuscript	Lectures 3-7	Writing assignments 1-3; final exam
Critique journal articles with respect to inclusion of pertinent information	Lectures 8-9	Writing assignment 4; final exam
Explain the purpose of various sections of a grant application and of grant review	Lectures 10-13	Writing assignment 5; final exam
Present scientific content in both written and oral formats in a manner accessible to a lay audience	Lectures 14-15	Writing assignment 6; oral presentation



Excerpts from MBIOS 494:

**Course Objectives**

The goal of this course is to develop skills that will enhance the ability of SMB graduates to use their scientific knowledge in the workplace. To this end, students will participate in a variety of activities and complete assignments designed to enhance their **science communication skills**.

WSU Learning Goals of the Baccalaureate	Student Learning Outcomes At the end of the course students should be able to	Course topics/dates	Evaluation of outcome
Critical & Creative Thinking	Communicate both the significant findings of cutting-edge research and their societal implications	All	All
Quantitative Reasoning	Analyze and synthesize scientific data from various sources	Weeks 2-3	All
Scientific Literacy	Read and comprehend a scientific paper, articulate its main points, and identify the strengths and weaknesses of the work	Weeks 2-3	All
Information Literacy	Discern the main ideas from a source and clearly articulate them in writing	Week 2-3	All
Diversity	Address controversial topics in science, <u>taking into account</u> the ethical concerns of different groups	Weeks 4-13	All
Communication	Communicate scientific findings via different modes, e.g., an oral presentation, a poster presentation, and in writing	Weeks 4-13	All
Depth, Breadth, and Integration of Learning	Survey the scientific literature on a topic and prepare a summary suitable for a lay, physician, and scientific audience	All	All

PharMedS 425 Medical microbiology: bugs and drugs AND MBIOS 410 Medical microbiology  
Excerpts from PharMedS 425:

11	Pathogens as parasites	
12	Spread and replication	
13	Persistent infections	
14	Bacteria I	
15	Bacteria II	
16	Bacteria III	
17	Antibacterial drugs I	
18	Antibacterial drugs II	



30	Upper respiratory tract infections	
31	Lower respiratory tract infections	
32	Urinary tract infections	
33	Sexually transmitted infections	
34	Gastrointestinal tract infections	
35	Obstetric and perinatal infections	
36	Central nervous system infections	
37	<b>EXAM 4</b>	
38	Eye infections	
39	Skin, soft tissue, and muscle infections	
40	Vector-borne infections	
41	Infections in a compromised host	
42	Diagnosis of infections	
43	Septic shock and its treatment	
44	Epidemiology and control of infectious diseases	

Excerpts from MBIOS

January	9	Dr. Konkel	Preface	Course Introduction
	11	Dr. Konkel	Chapter 12	Poster Assignment/Bacterial Anatomy
	13	Dr. Konkel	Chapter 12	Bacterial Anatomy/Structure and Function
	16		CLASS HOLIDAY	Martin Luther King, Jr. Day
	18	Dr. Konkel	Chapter 12	Bacteria - Structure and Function (Quiz 1)
	20	Dr. Konkel	Chapter 12	Bacteria - Structure and Function
	23	Dr. Konkel	Chapter 17	Antibiotics I
	25	Dr. Konkel	Chapter 17	Antibiotics II (Quiz 2)
	27	Dr. Konkel	Chapter 17	Antibiotics III
	February	30	Dr. Konkel	Chapter 14
1		Dr. Konkel	Chapter 14	Mechanisms of Pathogenesis II (Quiz 3)
3		Dr. Konkel	Chapter 14	Mechanisms of Pathogenesis III
6		Dr. Konkel	Chapter 14	Mechanisms of Pathogenesis IV
8		Dr. Konkel	Lecture only*	Bacterial Secretion (Quiz 4)
10		Dr. Konkel	Chapter 13+Lecture*	Gene regulation/Microbial Genetics
13		Dr. Konkel	Chapter 13+Lecture*	Microbial Genetics > Gene Deletions
15		Dr. Konkel	Lecture only*	Gene Deletions (Quiz 5)
17		Dr. Konkel	Lecture only*	Epidemiology
20			CLASS HOLIDAY	Presidents' Day
March	22	Dr. Konkel	Chapter 22	<i>Mycobacterium tuberculosis/leprae</i> (Quiz 6)
	24	Dr. Konkel	Chapter 22	<i>Mycobacterium tuberculosis/leprae</i>
	27	Dr. Konkel	Chapter 22	<i>Streptococcus pyogenes</i> (GAS)
	1	Dr. Konkel	Chapter 19	<i>Streptococcus pneumoniae</i> (Quiz 7)
	3	Dr. Konkel	Chapter 20	<i>Bacillus anthracis</i>
	6	Dr. Konkel	Chapter 21	<i>Listeria monocytogenes</i>
	8	Dr. Konkel	Chapter 21	<i>Corynebacterium diphtheriae</i> (Quiz 8)
	10	Dr. Konkel	Chapter 29	<i>Legionella pneumophila</i>

410:



13-17	SPRING RECESS		
20	Dr. Konkel	Chapter 29	<i>Bordetella pertussis</i>
22	Dr. Konkel	Chapter 30	<i>Clostridium tetani</i> (Quiz 9)
24	Dr. Konkel	Chapter 30	<i>Clostridium botulinum</i>

Date in blue = Pre-class quiz

**MBIOS 410**

Room:  
Tentative Schedule

Spark: A1H 327  
MWF 9:10 - 10:00

DATE	LECTURER	READINGS	TOPIC
March	27 Dr. Konkel	Chapter 23	<i>Neisseria gonorrhoeae</i>
	29 Dr. Konkel	Chapter 35	<i>Chlamydia trachomatis</i> (Quiz 10)
	31	Open	Content to be determined
April	3 Dr. Konkel	Chapter 28	<i>Helicobacter pylori</i>
	5 Dr. Konkel	Chapter 28	<i>Campylobacter</i> (Quiz 11)
	7 Dr. Konkel	Chapter 26	<i>Vibrio cholerae</i>
	10 Dr. Konkel	Chapter 32	<i>Treponema pallidum</i>
	12 Dr. Konkel	Chapter 32	<i>Borrelia burgdorferi</i> (Quiz 12)
	14 Dr. Konkel	Chapter 32	<i>Borrelia</i> spp. (Relapsing Fever)

PharMedS 425 Medical microbiology: bugs and drugs AND MBIOS 440 Immunology

**Topic Outline**

Lecture	Topic:	Instructor- TBD
1	Course overview	
2	Infection and infectious diseases	
3	General overview of the body defense systems	
4	Innate immunity	
5	Adaptive immunity	
6	Vaccination and immune testing	
7	Background to infectious diseases	
8	Entry, exit, and transmission	
9	Immune defense	





Excerpts from PharMedS 425:

Excerpts from MBIOS 440:

Day	Date	Topic	Parham Chapter (5e)	Notes; Assignments
1	M Aug 22	Set-up, Introduction and Overview	1	
2	W Aug 24	Overview and Innate Immunity	1, 2	
3	F Aug 26	Innate Immunity: Immediate reactions	2	Perusall R01
4	M Aug 29	Innate Immunity: Induced reactions	3	
5	W Aug 31	Innate Immunity and Inflammation	3	
6	F Sept 2	Innate Immunity and Immunopathology	3	Perusall R02
--	M Sept 5	<i>Labor Day Holiday</i>		
7	W Sept 7	Antibody Structure and B cell Diversity	4	
8	F Sept 9	Antibody Structure and B cell Diversity	4	Perusall R03
9	M Sept 12	B cell Diversity; Antigen Recognition by T-cells	4, 5	
10	W Sept 14	Antigen Recognition by T-cells	5	
11	F Sept 16	Antigen Recognition by T-cells	5	Perusall R04
--	M Sept 19	<b>Mid-term Exam #1 (through 9/16)</b>	1-5	no lecture; evening exam
--	Tu Sept 20	<i>WSU Add/Drop Deadline</i>		
12	W Sept 21	Development of B Lymphocytes	6	
13	F Sept 23	Development of B and T-cells	6, 7	Perusall R05
14	M Sept 26	T-cell-mediated Immunity	8	
15	W Sept 28	T-cell-mediated Immunity	8	
16	F Sept 30	Adaptive and T-cell-mediated immunity	8	Perusall R06
17	M Oct 3	Immunity mediated by B-cells and Antibody	9	
18	W Oct 5	Antibody, Preventing Infection at Mucosal Surfaces	9, 10	

**Syllabus: MBioS 440/540 Immunology Fall 2021**

19	F Oct 7	T-cell-, B-cell, and Gut-mediated Immunity (8-10)	10	Perusall R07
20	M Oct 10	Immunological Memory and Vaccination	11	
21	W Oct 12	Vaccines (11)	11	

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PharMedS 499 Special problems AND MBIOS 498 Directed research  
 Excerpts from PharMedS 499:



### Course Objectives

After completing this course, the student should be able to:

- 1) Discuss background literature relevant to their research project.
- 2) Describe the methodology used in their research project.
- 3) Provide written and/or oral reports of the results of their research.

### Course Expectations

Students are expected to work with the instructor to develop a plan for the semester. This plan should include agreements regarding the time spent in the lab and/or meeting with the instructor, attendance at meetings of the research group, reporting of their results at the end of the semester, and deadlines for reports or other assessments.

Excerpts from MBIOS 498:

#### **MBIOS 498**

Students can sign up for MBioS 498 credits anytime scientific experience is being obtained **WITHOUT** financial gain. Completion of a minimum of 1 credit of MBioS 499 is required to enroll. Starting Spring 2010: graded credits are available only to admitted SMB majors or by departmental approval. Return completed form to Brooke at wolfb@wsu.edu for enrollment, restricted course. Students who sign up for 498 credits must complete an oral or poster presentation at public venue (WSU, regional or national). An electronic copy of the poster or talk abstract+ PowerPoint file must be emailed to Brooke prior to the end of each semester.

A grade is assigned to 498 credits. The supervising professor will be responsible for assigning grades based upon the student's research performance, oral or poster presentation.

Students will register for these credits, pay tuition, and spend the required number of hours in the laboratory within the same semester. Exceptions to this rule may be possible depending on students' circumstances, but they will require the written approval of both the supervising professor and the Associate Director of Undergraduate Studies before enrollment.

For MBioS 498 credits, 45 hours work = 1 credit per semester. Each credit during summer session is also equivalent to 45 hours of work, but the research time span is variable

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### PharMedS 499 Special problems AND MBIOS 499 Special problems

Excerpts from PharMedS 499:



### **Course Objectives**

After completing this course, the student should be able to:

- 1) Discuss background literature relevant to their research project.
- 2) Describe the methodology used in their research project.
- 3) Provide written and/or oral reports of the results of their research.

### **Course Expectations**

Students are expected to work with the instructor to develop a plan for the semester. This plan should include agreements regarding the time spent in the lab and/or meeting with the instructor, attendance at meetings of the research group, reporting of their results at the end of the semester, and deadlines for reports or other assessments.

Excerpts from MBIOS 499:

#### **MBIOS 499**

MBioS 499 credits are available to all SMB majors and they can be earned through a variety of activities including, but not limited to: directed laboratory research, directed library research, and special topics courses. Students who are earning these credits **CANNOT** receive financial compensation for their efforts. The supervising professor will be responsible for assigning an S or F grade at the end of the semester. Students will register for these credits (email completed form to [wolfb@wsu.edu](mailto:wolfb@wsu.edu), restricted course), pay tuition, and spend the required number of hours working within the same semester. Exceptions to this rule may be possible depending on student's circumstances, and they will require the written approval of both the research supervisor and the Associate Director of Undergraduate Studies before enrollment.

For MBioS 499 credits, 45 hours work= 1 credit per semester Each credit during summer session is also equivalent to 45 hours of work, but the research time span is variable.