Course Change Request

New Course Proposal

Date Submitted: 11/18/22 11:59 am

Viewing: BIOL 565 : Medical Microbiology

Last edit: 04/13/23 9:36 am

Changes proposed by: dstgerma

In Workflow

1. **BIOL Graduate Representative**
2. **SC Curriculum Committee**
3. SC Associate Dean
4. Assoc Provost-Graduate
5. Registrar-Courses
6. Banner

Approval Path

1. 04/07/23 1:07 pm Iosif Vaisman (ivaisman): Approved for BIOL Graduate Representative

Are you completing this form on someone else's behalf?

Yes

Requestor:

Name	Extension	Email
Donna Fox	3-8797	dfox1@gmu.edu

Effective Term: Spring 2023

Subject Code: BIOL - Biology

Course Number: 565

Bundled Courses:

Is this course replacing another course? No

Equivalent Courses:

Catalog Title: Medical Microbiology

Banner Title: Medical Microbiology

Will section titles vary by semester? No

Credits: 3

Schedule Type: Lecture

Hours of Lecture or Seminar per week: 3

Repeatable: May only be taken once for credit, limited to 2 attempts (N2)

Max Allowable Credits: 6

Default Grade Mode: Graduate Regular

Recommended Prerequisite(s):

None

Recommended Corequisite(s):

None

Required Prerequisite(s) / Corequisite(s) (Updates only):

None

Registrar's Office Use Only - Required Prerequisite(s)/Corequisite(s):

And/Or	(	Course/Test Code	Min Grade/Score	Academic Level	)	Concurrency?

Registration Restrictions (Updates only):

Registrar's Office Use Only - Registration Restrictions:

Field(s) of Study:

Class(es):

Level(s):

Degree(s):

School(s):

Catalog Description:

The course explores human diseases caused by medically important bacteria, fungi, parasites and viruses. The mechanisms of disease pathogenesis are discussed, as are their clinical manifestations, diagnosis and treatment.

Justification:

o What: Creating a new course.

o Why: The course has been offered as selected topics for several years and has been very successful. We have been asked by COS Academic Affairs Dean to create a unique course with its own number. The new course would be open to graduate students, and to undergraduate students with permission.

Does this course cover material which crosses into another department? No

Learning Outcomes:

The students are expected to gain a basic understanding of the biology and pathology of medically-important bacteria, fungi, parasites, viruses and prions. They are also expected to gain a basic understanding of treatment modalities for infectious diseases, including antibiotics, antivirals and vaccines.

Attach Syllabus

BIOL 565 Medical Micro Syllabus Andalabi.pdf

Additional Attachments

Staffing:

This course has been taught for approximately 8 years as BIOL506 (Selected Topics in Microbiology). Because of its success, the professor of record will continue teaching the course under its unique course number.

Relationship to Existing Programs:

This course is a required course for the Enlisted to Medical Degree Preparatory Program and has been taught for 8 years under the BIOL506 designation.

Relationship to Existing Courses:

COS has no pre-existing course that meets the requirements of this proposed course.

Additional Comments:

Reviewer Comments

Key: 17926

BIOL 586 Medical Biochemistry (3 credits)

Instructor: Yuliya Dobrydneva, Ph.D.
Time: 7.20 – 10.00 pm every Wednesday

Class meets online via zoom. Link to the class is on Bb in the Zoom tab on the left.
Contact information: the best way to reach me is by email ydobrydn@gmu.edu

Bulletin Description: Biochemistry involves the study of the molecular composition of living cells, the organization of biological molecules within the cell, the structure and function of these biological molecules and the relationship between structure and function. Methods and approaches used in the present course will be correlated will the biochemical basis of human disease.

Number of Credit(s): 3
Prerequisites: Successful (minimum grade of C-) completion of Organic Chemistry I and Organic Chemistry II or equivalent courses

Overall Course Learning Objectives:
Course is divided into two units. The first unit examines the structure of cellular proteins and catalysis. The second unit focuses on cellular metabolism, the use of biomolecules as energy sources, and the synthesis of key cellular components and intercellular signaling molecules (hormones).

Upon successful completion of the didactic portion this course, the learner will be able to:

1. Create correct representations of 3D structure of biomolecules and spatial arrangement of functional groups
2. Describe the relationship between structure and function for main classes of biomolecules such as proteins, carbohydrates, nucleic acids and lipids.
3. Describe the roles of different classes of biomolecules in metabolism and the regulation and coordination of major metabolic pathways
4. Apply principles of inter and intramolecular interactions, enzyme catalysis, and structural analysis to biochemical reactions.
5. Analyze mechanism of enzymatic reactions and predict the products.
6. Identify molecular and biochemical basis of human disease states and explain biochemical mechanisms of disease.

Required Text: Biochemistry: Jeremy M. Berg, John L. Tymoczko and Lubert Stryer 9th edition (2019).

Components of the Final Grade:

Weekly quizzes, weighted evenly 20%

Exam I 20%
Exam II 20%
Exam III 20%
Final Exam (cumulative) 20%

- All exams, assessments and quizzes are administered via Bb only! Please be sure that you are proficient in basic functionality of Bb
- Course announcements are the main way to communicate with the class. Please be sure that your email is set up to receive announcements from GMU Bb.
- **All exams and quizzes are open book, open notes, open everything and untimed**
- The final exam will be given according to the university schedule.
- Important: **Exams are not repeatable. When you sign up for this class, you are committing to come to the class for exams.**
- Final exam will be administered during the finals week (TBA)

Grading: Students will receive a letter grade based on a 100-pointscale. An A+ is not awarded as a final grade. **No extra credit is allowed in this course!**

Letter grades for the course will be assigned as follows:

Based on AP.3.2 Graduate Grading Grade

	Quality Points	Graduate Courses
A+	4.00	Satisfactory/Passing
A	4.00	Satisfactory/Passing
A-	3.67	Satisfactory/Passing
B+	3.33	Satisfactory/Passing
B	3.00	Satisfactory/Passing
B-	2.67	Satisfactory (1)/Passing
C	2.00	Unsatisfactory/Passing
F	0.00	Unsatisfactory/Failing

Letter grades for the course will be based on an overall % for the course and assigned as follows:

Grades Scored Between				Will Equal
92	% and	100	%	A
90	% and Less Than	92%		A-
87	% and Less Than	90%		B+
84	% and Less Than	87%		B
77	% and Less Than	84%		B-
60	% and Less Than	77%		C
0	% and Less Than	60%		F

(1) Although a B- is a satisfactory grade for a course, students must maintain a 3.00 average in their degree program and present a 3.00 GPA on the courses listed on the graduation application.

Grades will not be rounded up. Therefore, if you receive a grade of 76.99, your grade will be C, not B-.

Expectations:

- Let Dr. Dobrydneva know of your needs and constraints as early as possible **prior** to the assignment due dates.
- Notify Dr. Dobrydneva during the first week of the semester regarding course schedule conflicts due to military obligations and/or religious observances.
- **Any notifications beyond the first week of classes or after the exam/quiz due date has passed may not be approved and grade of zero will be entered.**

LATE POLICY: PLEASE READ CAREFULLY!

- Students should make every effort to submit/complete assignments on time.
- **Any assignment that is not turned in on time, without prior arrangements with the instructor, will result in a zero grade for this assignment**
- Any arrangements to extend a deadline for an assignment must be made prior to the deadline.
- No extension will be granted after the deadline.
- Each student is allowed maximum of two (2) extensions per semester. Other requests may not be granted and grade of zero will be entered
- Any assignment/assessment that has not been completed by the end of the semester will receive a grade of zero.

Required Equipment –Since this is an online course and all assessments are complete through the computer, you need to have a computer with a **reliable** internet connection**.**

Technology Requirements: ***It is a student's responsibility to ensure access to a reliable internet for quizzes, exams and lectures.***

- **Hardware**: You will need access to a Windows or Macintosh computer with at least 2GB of RAM and access to a fast and reliable broadband internet connection (e.g., cable, DSL). A larger screen is recommended for better visibility of course material. You will need speakers or headphones to hear recorded content and a headset with a microphone is recommended for the best experience. For the amount of Hard Disk Space required, when taking a distance education course, consider and allow for:
    1. the storage amount needed to install any additional software and
    2. space to store work that you will do for the course.

  If you consider the purchase of a new computer, please go to Patriot Tech to see recommendations.

- **Software**: Many courses use Blackboard as the learning management system (LMS). You will need a browser and operating system that are listed compatible or certified with the Blackboard version available on the myMason Portal . See supported browsers and operating systems. Login to myMason to access your registered courses. Some courses may use other learning management systems. Check the syllabus or contact the instruct for details. Online courses typically use Acrobat Reader, Flash, Java, and Windows Media Player,

QuickTime and/or Real Media Player. Your computer should be capable of running current versions of those applications. Also, make sure your computer is protected from viruses by downloading the latest version of Symantec Endpoint/Anti-Virus software for free here.

- Students owning Macs or Linux should be aware that some courses may use software that only runs on Windows. You can set up a mac computer with Boot Camp or virtualization software so Windows will also run on it. Watch this video about using Windows on a Mac. Computers running Linux can also be configured with virtualization software or configured to dual boot with Windows. Note: If you are using an employer-provided computer or corporate office for class attendance, please verify with your systems administrators that you will be able to install the necessary applications and that system or corporate firewalls do not block access to any sites or media types.

Schedule Spring 2022 Medical Biochemistry BIOL 508

Schedule may be subject to change! Please stay tuned for the announcements.

Week	Lecture dates	Assignment
Week 1	January 26	Lecture Enzymes Weekly quiz
Week 2	February 2	Lecture Enzyme kinetics Weekly quiz
Week 3	February 9	Lecture Hemoglobin Weekly quiz
Week 4	February 16	Lecture Enzyme regulation Weekly quiz
Week 5	February 23	**Exam 1**
Week 6	March 2	Lecture Metabolism overview Weekly quiz
Week 7	March 9	Lecture Glycolysis Weekly quiz
Spring break	**March 14 – March 20**	**No classes**
Week 8	March 23	Lecture Krebs Weekly quiz
Week 9	March 30	Lecture Oxphos Weekly quiz
Week 10	April 6	**Exam 2**
Week 11	April 13	Lecture Glycolysis/gluconeogenesis Weekly quiz
Week 12	April 20	Lecture PPP. Lipids. Weekly quiz
Week 13	April 27	Lecture Integration metabolism Weekly quiz
Week 14	May 4	**Exam 3**
Week 15 Finals week	May 11 – May 18	**Final Exam (TBA)**

Medical Biochemistry weekly schedule

Note: reading chapters are form Stryer, 8th edition.

Lecture 1 Ch.8	Enzymes: Mechanisms of Catalysis Part 1 *Nutrition and Vitamins* Weekly Quiz	1. Describe properties of enzymes as biological catalysts 2. Describe how Enzymes Accelerate Reactions by Facilitating the Formation of the Transition State 3. Apply classification Types of enzymatic reactions depending on the reaction mechanism 4. Describe structure and function Vitamins as Coenzymes
Lecture 2 Ch.9	Enzymes: Mechanisms of catalysis Part 2 *Food digestion* Weekly quiz	1. Describe types of catalytic mechanism. 2. Describe mechanism of catalysis by Serine Proteases.
Lecture 3 Ch.8	Enzymes: Kinetics and Inhibition Part 1 Weekly Quiz	1. Explain how The Michaelis-Menten Model Accounts for the Kinetic Properties of Many Enzymes. 2. Explain how Enzymes Can Be Inhibited by Specific Molecules 3. Determine V max and K M by Double-Reciprocal Plots 4. Describe how Isozymes Provide a Means of Regulation Specific to Distinct Tissues and Developmental Stages. 5. Explain how enzymes Are Activated by Proteolytic Cleavage
Lecture 4 Handout	Enzymes: Kinetics and Inhibition Part 2 *Drug discovery and development* Weekly Quiz	1. Explain the types of Types of enzyme inhibition: reversible vs irreversible. 2. Draw and analyze Double reciprocal plots. 3. Apply Kinetics of reversible inhibition and distinguish between competitive, uncompetitive, non-competitive and Substrate inhibition.

Lecture 5 Ch.7	Enzyme regulation. Hemoglobin *Anemia. Sickle cell disease* Weekly Quiz	1. Explain how Hemoglobin functions as an honorary enzyme. 2. Describe the mechanism of Hb Transports of Oxygen 3. Explain mechanism Cooperativity and Allosterism 4. Explain how Regulation of oxygen affinity to Hb promotes oxygen release in hypoxia. 5. Analyze Bohr effect. 6. Explain mechanism of CO poisoning. 7. Explain molecular mechanism of Sickle cell disease
Lecture 6 (Ch.3)	Protein Analysis and Purification techniques *Medical laboratory technology* Weekly Quiz	Explain biochemical principle and analyze data obtain by the following techniques: electrophoresis and 2D electrophoresis, affinity chromatography, ion exchange chromatography, gel filtration, HPLC, Mass spectroscopy, ultracentrifugation, dialysis, western blots, enzyme-linked assay radioimmunoassay
Lecture 7 Ch.9 and 10	Enzyme regulation. *Blood clotting.* *Bacterial infections* Weekly Quiz	1. Explain biological basis of enzyme regulation, including feedback inhibition, allosteric control, proteolysis. 2. Explain how Aspartate Transcarbamoylase is allosterically inhibited by the end product of its pathway. 3. Explain mechanism of protein kinases 4. Explain how Serine-threonine kinases regulate signal transduction. Explain Kinase-phosphatase cascades and their reciprocal regulation. Explain second messenger system and role of cAMP and PKA. 5. Describe PKA regulation by cAMP. 6. Describe ADP ribosylation of G-proteins. 7. Explain mechanism of Proteolytic cascades and their role in digestion and blood clotting.
Exam I		Midterm exam

Lecture 8 Ch.15	Overview of Metabolism *Exercise and obesity* Weekly Quiz	1. Describe three Stages of catabolism. 2. Explain how ATP availability regulates metabolism. 3. Compare and contrast Anabolic vs catabolic pathways and NADP vs NADPH.
		1.
Lecture 10 Ch.17	Krebs cycle *Hereditary diseases* Weekly Quiz	1. Describe Aerobic catabolism of pyruvate. 2. Describe PDH complex, reaction sequence and cofactors and clinical forms of PDH deficiency. 3. Describe a biochemical basis of TCA. 4. Describe and name main Enzymes of TCA cycle. 5. Predict ATP yield in TCA cycle. 6. Explain the Regulation of TCA cycle. 7. Describe how Anaplerotic reactions regenerate TCA cycle intermediates.
Lecture 11 Ch.18	Ox-phos *Respiration. Toxins and poisons.* Weekly Quiz	1. Describe the function of Oxidative phosphorylation and electron transfer chain. 2. Explain the biochemical foundation of Chemiosmotic hypothesis. 3. Describe organization of Respiratory complexes in mitochondria. 4. Explain how Electron transport is coupled to ATP synthesis. 5. Describe molecular mechanism of ATP synthase. 6. Explain molecular mechanism of Regulation of ox-phos.
Lecture 12 Ch.16,21	Glucose homeostasis *Diabetes* Weekly Quiz	1. Compare and contrast Glycolysis and gluconeogenesis. 2. Explain Reciprocal regulation of glycolysis vs gluconeogenesis in liver. 3. Describe stages of Glycogen metabolism. 4. Describe Metabolic fate of glucose-6-phosphate. 5. Describe the Reciprocal regulation of glycogen metabolism and degradation. 6. Compare and contrast Glycogen phosphorylase vs glycogen synthase. 7. Describe action of Bicyclic cascades. 8. Explain molecular mechanism of Insulin action.

Lecture 13 Ch.20	Pentose phosphate pathway *Hereditary diseases* Weekly Quiz	1. Describe biochemical role of PPP, or hexose monophosphate shunt. Explain G-6-P dehydrogenase deficiency in erythrocytes. 2. Describe biochemical role of Glutathione.
Lecture 14 Ch.22	Lipids. *Atherosclerosis.* Weekly Quiz	1. Explain the role of Fatty acids and triacyl glycerols as a source of energy. 2. Describe Metabolic fate of fat. 3. Compare and contrast Fatty acid degradation vs synthesis. 4. Define Distinct pathways and cofactors of FA acid degradation and synthesis. 5. Describe molecular mechanism of Beta-oxidation. Describe biological role of Phospholipids, Arachidonic acid and eicosanoids. 6. Explain Regulation of FA metabolism. 7. Explain biological mechanism of Fasting and Diabetes. 8. Describe biological role of Ketone bodies.
Lecture 15 Ch. 27,	Metabolic regulation *Fasting, starvation and diabetes*	1. Explain Metabolic regulation of energy homeostasis. 2. Compare and contrast Fate of dietary glucose, FA and a/a in fed vs fasting vs starved state. 3. Describe biochemistry of Fuel metabolism of the major organs. Compare and contrast how Insulin vs glucagon maintain fuel homeostasis. 4. Describe the Metabolic fate of glycolytic intermediates.
Exam II		Final, cumulative