Washington State University
MAJOR CURRICULAR CHANGE FORM - - NEW/RESTORE COURSE

- ☐ **Please attach rationale for your request, a complete syllabus**, and explain how this impacts other units in Pullman and other campuses (if applicable).
- ☐ **Obtain all required signatures with dates.**
- ☐ **Provide original stapled packet of signed form/rationale statement/syllabus** PLUS **10 stapled copies** of complete packet to the **Registrar's Office**, campus mail code 1035.
- ☐ **Submit one electronic copy of complete packet** to wsu.curriculum@wsu.edu.

Requested **Future** Effective Date: Summer 2016 (term/year) Course Typically Offered: Summer

DEADLINES: For fall term effective date: **October 1st**; for spring or summer term effective date: **February 1st**. See instructions.

NOTE: Items received after deadlines may be put to the back of the line or forwarded to the following year. Please submit on time.

☒ **New Course** ☐ Temporary Course ☐ **Restore Course**

MBioS	585	Molecular Biotechniques
course subject/crosslist	course no.	title

2	(2 -)	
Credit hrs	lecture hrs per week / lab or studio hrs per week	prerequisite

Description for catalog: Background and application of classical and current techniques involved in cloning, characterization, modification and expression of genes

Additional Attributes: Check all that apply.

☐ Crosslisting (between WSU departments)* ☐ Conjoint listing (400/500):_____

☐ Variable credit:_____ ☐ Repeat credit (cum. max. hrs):_____

Special Grading: ☐ S, F; ☐ A, S, F (PEACT only); ☐ S, M, F (VET MED only); ☐ H, S, F (PHARMACY, PHARDSCI only)

☐ Cooperative with UI ☐ Other (please list request): _____

The following items require prior submission to other committees/depts. (SEE INSTRUCTIONS.)

☐ Request to meet Writing in the Major [M] requirement **(Must have All-University Writing Committee Approval.)**

☐ Request to meet UCORE in _____ **(Must have UCORE Committee Approval › › See instructions.)**

☐ Special Course Fee_____ **(Must submit request to University Receivables.)**

Contact: Todd Farmerie Phone number: 335-1138 Campus mail code: 7520

Email: farmerie@vetmed.wsu.edu Instructor, if different:_____

9/24/15	9-27-15	
Chair/date	**Dean/date**	**All-University Writing Com / date**
Chair (if crosslisted/interdisciplinary)*	**Dean (if crosslisted/interdisciplinary)***	**UCORE Committee Approval Date**
Catalog Subcommittee Approval Date	**GSC or AAC Approval Date**	**Faculty Senate Approval Date**

***If the proposed change impacts or involves collaboration with other units, use the additional signature lines provided for each impacted unit and college.**

This two-course proposal is intended to provide the primarily-online students of the Professional Science Masters (PSM) program with an understanding of the techniques used in molecular biology from the perspective of their application in a laboratory setting. The program includes individuals who aspire to manage experimental laboratories, as well as secondary education instructors who may wish to integrate some of these techniques and principles into their classrooms. PSM leadership thinks that both of these groups would benefit from an understanding of the procedural nuts and bolts involved in these techniques, knowledge that on-campus students typically gain through their laboratory work.

The proposed courses complement several changes being instituted in the MBioS graduate curriculum. The content of MBioS 503 & 504 (Molecular Biology I & II) has been merged into a single class that mostly depends on analysis of primary scientific literature. This will result in the elimination of much of the molecular technique content that had been in these classes. The new courses are intended to serve as electives for the PSM curriculum, replacing the discontinued MBioS 504. The courses also fit with the modular course credit structure of the newly-instituted Topics courses (MBioS 525, 529), allowing a mix-and-match opportunity involving those courses and either of the proposed offerings.

While there is passing mention of techniques in most graduate biomedical courses, it is done with a view toward learning the cell or molecular processes the techniques are used to study, while the proposed courses focus on the techniques themselves. A couple of current classes have more significant coverage of molecular techniques:

- MBioS 503/504: Molecular Biology I & II. In the past, certain instructors of these team-taught courses would focus on molecular techniques for their third of the course. Most have focused more on cellular mechanisms, only introducing techniques where they might elucidate these processes. The expansion of the scope of 503 to include material formerly covered in 504, and the latter's discontinuance, will leave little directed instruction in molecular techniques in MBioS 503.
- CHE/MBioS 574: Protein Biotechnology. This on-campus course primarily serves the Biotechnology Training Program. It includes a handful of lectures addressing the basic techniques involved in biotechnology, but the course primarily focusses on the production of marketable products. It emphasizes group planning, large-scale production, commercialization and entrepreneurship. The proposed courses will cover protein biotechnology procedures in more detail, and will also include a range of techniques that do not form part of the material covered by 574.

MBioS 585 will be delivered on-line, with 30 instructional units roughly corresponding to 50-minute lectures. MBioS 586 is a hybrid course, with 40 hours of laboratory activities in the presence of the instructor, coupled with additional on-line assignments and activities that should take a minimum of 5 hours. The courses have been developed and will be taught by Dr. Todd Farmerie, annually during summer sessions. Compensation will use a combination of base pay and enrollment-based revenue model (Annual Average Full Time Equivalent Revenue Model). Dr. Farmerie has been teaching MBioS 504, which is slated for removal from the schedule, making the offering salary-neutral. Department-controlled laboratory space has been identified for MBioS 586, with reagents purchased through a course fee. We are coordinating with Global Campus for the online-delivery components of the courses. Publicity will be through the existing PSM marketing, as well as selected on-campus posting and emails.

MBioS 585
Molecular Biotechniques
Summer 2016

Course Overview
2 credits
Times: Online, Summer session, 12 weeks

Prerequisites
None

Course Instructor
Instructor: Todd Farmerie
Email: farmerie@vetmed.wsu.edu
Phone: (509) 335-1138
Office Hours: via online course space

Course Overview
The techniques of molecular biology have become pervasive in the biological and medical fields, as well as more diverse areas of study, such as anthropology and soil science. However the frequent use of commercial kits and 'cookbook' protocols often leaves practitioners with an insufficient understanding of the basic principles to enable them to troubleshoot problems. This class represents a survey of the techniques used in molecular biology. Topics will be presented in detail, covering the biochemical processes underpinning the techniques, their typical protocols and applications, as well as how they might be applied to novel questions. Coverage will include classical approaches and cutting-edge applications. This course is a companion to laboratory course, MBioS 586.

This course consists of 30 instructional units roughly equivalent in content and commitment to 50-minute lectures, with associated readings of papers from the scientific literature and related assignments. Students are free to pursue these activities at their own pace, so long as all assessments are completed by their respective deadlines. The course will end with the students completing a major written assignment utilizing what they have learned throughout the lectures and activities.

Course Materials
Lecture media, reading materials and assessment instructions are posted in the Blackboard Learn course space, or can be accessed via links posted there.

Graded Assessments

A. Exam (150 pts) – The course will have a single exam. Students must demonstrate knowledge of underlying cellular and biochemical mechanisms, the typical applications of these in biotechnology, their potential strengths and drawbacks. They will also be assessed on their ability to apply the techniques to address novel problems.

B. Quizzes (20 pts) – Two online quizzes will evaluate students' understanding of the lecture content, and the ability to apply this knowledge to hypothetical experimental situations. They are also intended to assist students in preparation for the exam.

C. Homework (30 pts) – Students will be asked to complete several homework assignments (see schedule). These will model activities that are performed in a laboratory while planning experiments or interpreting those of others. They will be relevant to the associated lecture material, both further illuminating and assessing the students' understanding of the topics covered. They will be evaluated based on successful completion of the exercises and a demonstration of understanding of the course concepts.

D. Proposal (100 pts) – Students will identify a question that can be addressed using the molecular tools covered in the class. After receiving prior approval based on novelty and feasibility, they will compose a formal proposal, giving the background of the problem they wish to address and a *detailed* description of the approach(es) they would use to address the question. Particular attention should be paid to the construction of the molecular tools (e.g. plasmids, viruses, GMOs) that are necessary to perform the proposed experiment. Students will not actually be performing the approach and thus are not limited by reagents or equipment availability, or hypothetical costs (within reason). Students may use something relevant to their own research, but should work independently of any lab personnel or their PI. Evaluation will assess understanding of the techniques, appropriateness of the approaches being brought to bear, as well as feasibility and complexity of the proposed experiment(s).

Total: 300 pts

Grading

Grades will be assigned based on points earned as follows:

A	≥90% (270 pts)
B	≥80% (240) - <90%
C	≥70% (210) - <80%
D	≥60% (180) - <70%
F	<60%

Course objectives and student learning outcomes
By the end of this course, students will be able to:

1. Understand the basic concepts underlying the molecular analysis and in vitro production of DNA, RNA and protein.
2. Apply this knowledge to experimental design.
3. Interpret descriptions of experimental approaches found in the scientific literature.
4. Critically evaluate published experimental design.
5. Describe and predict outcomes of future experiments.

Mapping of Student Learning Outcomes

Student Learning Outcomes for this course:	Course Topics addressing outcome:	Evaluation of Outcome (Assessments)
1. Basic concepts	Units 1-28	A, B, C, D
2. Apply to design	Units 1-30	A, B, C, D
3. Interpret literature	Units 1-28	C
4. Evaluate published design	Units 7-28	C
5. Predict outcomes	Units 7-28	A, C, D

Late Assignments
Assignments are due by midnight at the end of Saturday of the Summer semester week given in the syllabus (the precise date will appearing in the Blackboard course schedule). Each calendar day or portion thereof that an assignment is late will result in a deduction of 20% from the total points available from that assignment. No assignments will be accepted for grading after three full calendar days, although students are encouraged to complete late assignments so as not to miss out on the learning opportunity each entails.

Behavior and Participation Policy
Students should maintain a professional demeanor in all interactions with the professor, Virtual Mentor, TA, staff and classmates.

The course is delivered online, and students may set their own schedule for completing lessons and homework prior to the due dates. This is intended to allow the students to pursue the material either via a timeline typical of an on-campus course, or else in the more concentrated manner seen in intensive month-long 'mini-courses'. Students are strongly encouraged not to leave too much to the end, as the lectures, associated readings and exercises, study and review are expected to entail a minimum of three hours per instructional unit.

Disabilities Accommodation

Reasonable accommodations are available in online classes for students with a documented disability. All accommodations must be approved through your WSU Disability Services office. If you have a disability and need accommodations, we recommend you begin the process as soon as possible. For more information contact a Disability Specialist on your home campus:

- **Pullman or WSU Online**: 509-335-3417 http://accesscenter.wsu.edu, Access.Center@wsu.edu
- **Spokane**: http://spokane.wsu.edu/students/current/studentaffairs/disability/
- **Tri-Cities**: http://www.tricity.wsu.edu/disability/
- **Vancouver**: 360-546-9138 http://studentaffairs.vancouver.wsu.edu/student-resource-center/disability-services

Academic Integrity

Each student must turn in their own original work, using their own words. No assignment that is team composed, ghost-written, plagiarized or contains excessive quotation will be acceptable. Students who violate WSU's Standards of Conduct for Students will receive an F for the assignment or for the entire course, without the opportunity to withdraw, depending on the severity of the misconduct. All infractions will be reported to the Office of Student Conduct. For a detailed description of cheating, see http://apps.leg.wa.gov/wac/default.aspx?cite=504-26-010. It is strongly suggested that you read and understand these definitions.

Distribution of the course material, including but not limited to assignments, exercises, quizzes and exams, to third parties for the purpose of academic misconduct or commercial gain is prohibited.

WSU Safety Statement

Washington State University is committed to maintaining a safe environment for its faculty, staff, and students. Safety is the responsibility of every member of the campus community and individuals should know the appropriate actions to take when an emergency arises. In support of our commitment to the safety of the campus community the University has developed a Campus Safety Plan, http://safetyplan.wsu.edu. It is highly recommended that you visit this web site as well as the University emergency management web site at http://oem.wsu.edu/ to become familiar with the information provided.

Topics Covered:

Unit		Topic	Assessment	Due
Background	Unit 1	Chemistry of DNA, RNA & proteins		
	Unit 2	DNA enzymology		
	Unit 3	Recombination & repair		
	Unit 4	Expression		
	Unit 5	Cell biology	Quiz 1	Week 6
Techniques	Unit 6	Vectors		
	Unit 7	Plasmids	Hwk 1: Plasmid map	Week 6
	Unit 8	Viruses		
	Unit 9	Vector Construction		
	Unit 10	Transformation & transfection	Proposal topic for approval	Week7
	Unit 11	PCR		
	Unit 12	Mutagenesis by PCR		
	Unit 13	qPCR		
	Unit 14	Applications of PCR and its alternatives	Hwk 2: PCR primer design	Week 7
	Unit 15	Visualizing biomolecules		
	Unit 16	Isolation of biomolecules		
	Unit 17	Sequencing	Quiz 2	Week8
	Unit 18	Genomics		
	Unit 19	Bioinformatics		
	Unit 20	Hybridization		
	Unit 21	Protein/DNA interactions		
	Unit 22	Promoter characterization		
	Unit 23	Transgenics		
Advanced Applications	Unit 24	Cre-lox recombination		
	Unit 25	CRISPR	Hwk 3: Cre-lox strategy	Week 8
	Unit 26	siRNA		
	Unit 27	Chromatin structure		
Research Practice	Unit 28	Statistics		
	Unit 29	Research Ethics		
	Unit 30	Professional Practice (research funding and publication)	Hwk 4: Stats & Ethics	Week 8
Final assessments			Exam	Week 9
			Proposal	Week 11