



# Course Approval Form

For approval of new courses and deletions or modifications to an existing course.

registrar.gmu.edu/facultystaff/curriculum

### Action Requested:

Create new course       Inactivate existing course

Modify existing course (check all that apply)

Title       Credits       Repeat Status       Grade Type

Prereq/coreq       Schedule Type       Restrictions

Other: \_\_\_\_\_

### Course Level:

Undergraduate

Graduate

College/School:  Department:

Submitted by:  Ext:  Email:

Subject Code:  Number:  Effective Term:  Fall       Spring       Summer

(Do not list multiple codes or numbers. Each course proposal must have a separate form.)

Year:

Title: Current

Banner (30 characters max including spaces)

New

Credits: (check one)  Fixed       Variable       or  to

Repeat Status: (check one)  Not Repeatable (NR)       Repeatable within degree (RD)       Repeatable within term (RT)

Maximum credits allowed:

Grade Mode: (check one)  Regular (A, B, C, etc.)       Satisfactory/No Credit       Special (A, B, C, etc. +IP)

Schedule Type: (check one)  Lecture (LEC)       Lab (LAB)       Recitation (RCT)       Internship (INT)

Independent Study (IND)       Seminar (SEM)       Studio (STU)

Prerequisite(s):

Corequisite(s):

Instructional Mode:

100% face-to-face

Hybrid: ≤ 50% electronically delivered

100% electronically delivered

Restrictions Enforced by System: Major, College, Degree, Program, etc. Include Code.

Are there equivalent course(s)?

Yes       No

If yes, please list \_\_\_\_\_

### Catalog Copy for NEW Courses Only (Consult University Catalog for models)

<b>Description</b> (No more than 60 words, use verb phrases and present tense)	<b>Notes</b> (List additional information for the course)
Please see attached	A lab fee of \$300 will be charged per student for lab supplies. This fee will go directly to SSB's pool account to purchase supplies.
<b>Indicate number of contact hours:</b>	Hours of Lecture or Seminar per week: <input type="text" value="3 hrs for 4 sessions"/> Hours of Lab or Studio: <input type="text" value="8 hrs for 5 sessions"/>
<b>When Offered:</b> (check all that apply)	<input checked="" type="checkbox"/> Fall <input type="checkbox"/> Summer <input checked="" type="checkbox"/> Spring

## Approval Signatures

Department Approval \_\_\_\_\_ Date \_\_\_\_\_ College/School Approval \_\_\_\_\_ Date \_\_\_\_\_

If this course includes subject matter currently dealt with by any other units, the originating department must circulate this proposal for review by those units and obtain the necessary signatures prior to submission. Failure to do so will delay action on this proposal.

Unit Name	Unit Approval Name	Unit Approver's Signature	Date

### For Graduate Courses Only

Graduate Council Member \_\_\_\_\_ Provost Office \_\_\_\_\_ Graduate Council Approval Date \_\_\_\_\_

# Course Proposal Submitted to the Curriculum Committee of the College of Science

## 1. COURSE NUMBER AND TITLE: BIOL 678 “Cell-Based Assays”

**Course Prerequisites**: Permission of Instructor, and 400-level coursework in cell or molecular biology.

**Catalog Description**: The course will focus on 1) basics of eukaryotic cell culture; 2) various cell based assay techniques; 3) Real-Time PCR based functional analysis of the signaling pathways. Students will maintain their cell cultures for the duration of the experiments, perform at least one functional assay and analyze the resultant data. Students are expected to learn the properties and limitations of each cell based assay and should be able to explain their results regardless of the outcome. Each student will be responsible for submitting a written report summarizing the design of their experiments and its results. Each report will include the following sections: Introduction, Methods, Results and Discussion, and a special Troubleshooting section.

**2. COURSE JUSTIFICATION**: Students in the MS program in Biology are required to complete a lab course as part of the degree program. Non-degree and Bioinformatics students also benefit from hands-on lab training with a graduate faculty member.

**Course Objectives**: To train students in current lab methods of cell culture and assay techniques, and to perform analyses using traditional computational methods.

**Course Necessity**: Currently there are two other lab courses offered for both MS and PhD students in alternating spring semesters that are limited to 9 students. More lab courses are needed to allow students to meet the degree requirements.

**Course Relationship to Existing Programs**: A lab course in molecular techniques is required for the MS Molecular biology concentration.

**Course Relationship to Existing Courses**: This course has been taught 3 times in the last 4 years as BIOL 691 special topics. Enrollment is limited to lab supplies available, normally 6 students.

**3. APPROVAL HISTORY**: None

## 4. SCHEDULING AND PROPOSED INSTRUCTORS:

**Semester of Initial Offering**: Fall 2014

**Proposed Instructors**: Dr. Ancha Baranova

## 5. TENTATIVE SYLLABUS:

# **SYLLABUS:**

## **Cell based assays (2 credits)**

**Instructors:** Dr. Ancha Baranova (instructor of record); Dr. Aybike Birerdinc

Email: [abaranov@gmu.edu](mailto:abaranov@gmu.edu); [abirerdi@yahoo.com](mailto:abirerdi@yahoo.com)

Phone: 571-334-11-45 cell (Dr.Baranova)

**Pre-requisites: permission of instructor. Enrollment is limited to students in MS programs or non-degree studies students**

### **Synopsis:**

The course will focus on 1) basics of eukaryotic cell culture; 2) various cell based assay techniques; 3) Real-Time PCR based functional analysis of the signaling pathways. Students will maintain their cell cultures for the duration of experiments, perform at least one functional assay and analyze the resultant data. Students are expected to learn the properties and limitations of each cell based assay and should be able to explain their results regardless of the outcome. Each student will be responsible for submitting a written report summarizing the design of their experiments and its results. Each report shall include following sections: Introduction, Methods, Results and Discussion, and a special Troubleshooting section.

### **Course Materials:**

Students will receive an electronic zipped folder with course materials, including Power Point lectures, assays' leaflets in .pdf form and a number of review manuscripts and web manuals that will overview discussed lab techniques

## **Component 1: LECTURES (40% of the grade)**

**Lecture 1.** Overview of cell culture basics. Cell manipulation and detection.

**Lecture 2.** Principles of chemiluminescent assays

**Lecture 3.** Principles of qRT-PCR and its uses for functional profiling of the cellular pathway

**Exam.** Includes both 40% component and 10% component.

## **Component 2: SAB Tutorial (10% of the grade).**

Each student shall sign-up for SA Biosciences Web Tutorial. The schedule of tutorials will be given as these will become available. Grading of this component will be based on 1) screenshot or email confirming registration for the tutorial 2) **correctly completing tutorial related take-home quiz (due September XX).**

## **Component 3: LAB PRACTICE**

**(50% of the grade).**

This part include growth and maintenance of eukaryotic cells; performing at least one assay; data collection and analysis; troubleshooting. Student should expect that teaching of the laboratory techniques will happen during the day time (between 10 am and 4 pm) and shall plan accordingly. Days when cell culture will be started and maintenance days will be apart from each other; during the assay there will be at least two consecutive days when lab presence will be required. Lab practice will be graded based both on actual participation in the class and on final paper summarizing the design of their experiments and its results. Each report shall include following sections: Introduction, Methods, Results and Discussion, and a special Troubleshooting section that should detail and analyze any particular problems encountered. Materials for Introductory section could be drawn from Exam 1-3 reading materials.

### **Approximate Schedule of the Lab:**

**Day 1:** For each group of students (2x) one 95% confluent 75 cm flask is split into 6x 25 cm flasks. Cells are counted, and replated accordingly. Emphasis on sterile technique, use of hoods, etc. Overview of detailed protocol for the rest of the week.

**Day2:** Cells are treated with UV for RNA analysis:

In groups of 3 – each group will treat 2 of their flasks at different time points (one group 10 and 20, one group 30 and 40, one group 50 and 60) one flask will be used as a control for each group. At this point they should have 3x 25 cm flasks of cells left over.

Immediately following UV exposure cells will be trypsinized, RNA extracted, and cDNA will be made. An RT-PCR reaction in triplicate will be set up and executed with the selected primers. **IMPORTANT:** Please note: this is the LONG DAY

**Day3:** In groups of 3 – each group will treat 2 of their flasks at different time points (one group 10 and 20, one group 30 and 40, one group 50 and 60) one flask will be used as a control for each group. These cells will be used for apoptosis assay. RT-PCR results will be collected and assessed. RT reactions will be run on a gel to detect bands, results will be documented for write up.

**Day4:** Apoptosis assay.

Remaining cells will be subjected to apoptosis assay. Measurements will be taken with the Fluoroscan at 3 time points

**Day5:** Data will be collected, compiled, analyzed and discussed.

Overview of statistical tests needed to validate data will be given. Details of requisite write-up will be reviewed in detail.

Each group (of two students) may submit one compiled writeup, with detailed components, including:

- a. Introduction: Must include background on HepG2 cells, and UV effects on cell in culture
- b. Methods: Must include both general cell handling techniques, and specific RT and apoptosis assay techniques.
- c. Results: Must include data from both individual assays and all assays analyzed as a group. Must include statistical test results.

- d. Discussion: Must include interpretation of data, including a discussion of any discrepancies in the results and or problems encountered during the course of the experiment.
- e. Conclusion: Summary of experimental outcomes with interpretation of the biological meanings of the results.

Write-up of lab portion will be due November 17<sup>th</sup>. Same day we will have in-class Quizz that will include questions related to the LAB PORTION ONLY.

#### GRADE COMPONENTS:

Component	% grade
In-class exam for topics covered in Lectures	40%
In-class exam covering SA Tutorial	10%
Performance in the Lab, including Lab Report	40%
October 17 <sup>th</sup> in-class quiz covering Lab materials	10%
All other Discussion and Teacher's points	5%

#### GRADING STANDARDS for LAB PORTION:

- A grade of "A" is given for superlative work that demonstrates a profound commitment of the student, complete mastery of the class materials, and independent thought and work. With A grade PI shall feel that student can perform experiments in the lab with indirect (reporting) supervision.
- A grade of "A-" is given for solid work that completely fulfills all the requirements of the course and demonstrates mastery of the course content. With A- grade PI shall feel that student can perform experiments in the lab with indirect (reporting) supervision.
- A grade of "B+" is given for very good work that fulfills all the requirements of the course and demonstrates understanding of the course content. With B+ grade PI shall feel that student can safely perform experiments in the lab, but requires direct supervision.
- A grade of "B" is given for work that fulfills all the requirements of the course and understands most of its content. With B grade PI shall feel that student can safely perform experiments in the lab, but requires direct supervision.
- A grade of "B-" is given for work that fulfills all the requirements of the course but that falls short of demonstrating rigor. With B- graded student, PI shall feel that more shadowing/ observations are required from the student before he or she can safely perform experiments in the lab.
- A grade of "C" is given for work that fulfills all the requirements of the course in a satisfactory manner, but demonstrates incomplete understanding and lack of rigor. With C graded student, PI shall feel that more shadowing/ observations are required from the student before he or she can safely perform experiments in the lab.
- A grade of "D" is given for work that is unsatisfactory.
- A grade of "F" is given for work that fails to fulfill the requirements of the course.

**GMU Add/Drop Policy:** As per GMU academic calendar.

**Honor Code, Copyright, & Computing Policies:** *To promote a stronger sense of mutual responsibility, respect, trust, and fairness among all members of the George Mason University community and with the desire for greater academic and personal achievement, we, the student members of the university community, have set forth this honor code:* Student members of the George Mason University community pledge not to cheat, plagiarize, steal, or lie in matters related to academic work.

You are expected to adhere to all University policies and guidelines during your participation in this course. All work must be your own. Inappropriate use of the work of others is a George Mason University Honor Code violation. Please review the University's website for information on the following: Honor Code and Judicial Procedures; Copyright/Fair Use; and Responsible Use of Computing.

**If you are a student with a disability and you need academic accommodations** please see me and contact the Disability Resource Center (DRC) at 703.993.2474. All academic accommodations must be arranged through that office. Students must inform the instructor at the beginning of the semester, and the specific accommodation will be arranged through the Disability Resource Center.

**Writing Center:** Students who are in need of intensive help with grammar, structure or mechanics in their writing should make use of the services of the Writing Center, located in Robinson A116 (703-993-1200). The services of the Writing Center are available by appointment, online and, occasionally, on a walk-in basis.

**Other GMU resources:** <http://www.gmu.edu/departments/freshman/resources.html>  
University Policies: University Catalog can be accessed [catalog.gmu.edu](http://catalog.gmu.edu)  
University Libraries "Ask a Librarian" <http://library.gmu.edu/mudge/IM/IMRef.html>  
Counseling and Psychological Services (CAPS) [caps.gmu.edu](http://caps.gmu.edu) or (703) 993-2380

**It is not possible to receive an incomplete grade in this class.** If you anticipate difficulty in completing this course see your instructor immediately to discuss your options.