



TEXAS A&M  
UNIVERSITY

# SYLLABUS

## Course Information

**Course Title:** VTPP 223: Design of Experiments for Physiology Research

**Term:** Fall 2018

**Credit Hours:** 3 (2-1)

**Meeting Times:**

501: Tues 09:35 AM-12:25 PM (Vivarium III room 120)

Thurs 09:35 AM-11:15 PM (VIDI room 109)

502: Tues 02:20 PM-05:10 PM (Vivarium III room 120)

Thurs 02:20 PM-04:00 PM (VIDI room 109)

**Optional Help Period in computer lab:** See VIDI 109 schedule

**Meeting Locations:**

VIDI room 109 (<http://aggiemap.tamu.edu/?Bldg=1813>)

Vivarium III room 120 (<http://aggiemap.tamu.edu/?Bldg=1020>)

## Course Description and Prerequisites

**Course Description:** Team or group formulation and refinement of novel hypotheses and design of controlled in vitro experiments: emphasis on production of publishable research in physiology.

**Prerequisites:** VTPP 123 or permission from instructor.

## Learning Outcomes

This course is designed to provide a high-impact learning experience to improve student learning by developing the habits and skills for integrative and lifelong learning:

- **Master the depth of knowledge**, including the ability to articulate disciplinary and interdisciplinary theories, concepts, principles, skills in the biomedical sciences.
- **Demonstrate critical thinking**, including the ability to evaluate, analyze, and integrate information from a variety of sources from the biomedical literature; use appropriate strategies and tools to represent, analyze, and integrate physiological information; and develop critical, reasoned positions.
- **Communicate effectively**, including the ability to demonstrate effective writing and nonverbal communication skills (tables and graphs); and effectively communicate original and creative ideas to biomedical research community.
- **Practice personal and social responsibility**, including the ability to recognize ethical dilemmas in research and apply rational decision-making in order to address it; choose ethical courses of action in research and practice.
- **Prepare to engage in lifelong learning**, including the ability to exhibit the skills necessary to acquire, organize, reorganize, and interpret new knowledge; formulate a plan of personal goals for continued professional growth; and demonstrate intellectual curiosity.

## Teaching Philosophy

This course is designed so that you learn in the process of performing authentic, original research. To achieve the course learning outcomes, all course activities are informed by authentic scientific practices. Practicing biomedical researchers 1) guide their own learning, 2) collaborate in teams, 3) develop projects in identifiable stages, 4) create new knowledge, and 5) formally communicate results. By stepping you through the process that we use to create publishable research products, you will not only learn the skills and habits of thought of to be a successful biomedical researcher, you will have the opportunity to be inducted into the scientific community as a *practicing scientist*.

## Structure of the Course

The structure of the course is designed to produce biomedical research and biomedical researchers:

Flipped class: We will use a “flipped class” model in which short video lectures or written materials are studied outside of the classroom and collaborative projects are completed in the classroom.

- Learn basic material at your own pace
- Maximize meaningful contact with experts and peers in class working on collaborative projects

Team-based projects: All projects will be performed teams of students with diverse talents, skills and backgrounds.

- Complete each project in a team with diverse abilities to produce research faster
- Identify, leverage and develop your particular research talents

Scaffolding the discovery process in phases: The class is divided into distinct phases used by practicing scientists to scaffold the discovery process and maximize productivity.

- Introduce you to the minimum required knowledge to begin research
- Transition from consumption of standard knowledge to production of new knowledge

Learning by doing: We will minimize *teaching* you facts, concepts procedures with lectures or laboratory exercises with known outcomes. Instead, you will *learn* in the process of performing authentic research.

- Direct your own learning and teach each other
- Minimize the simple transfer of knowledge

Scientific Communication: All course products will be in standard forms used by biomedical scientists to communicate their results to other professionals.

- Learn to communicate in professional environments
- Course products have the potential to be submitted to conferences and peer-reviewed journals

## Instructor Information

Name	Christopher Quick	
Telephone	979-845-2645	
Email	cquick@tamu.edu	
Office hours	By appointment	
Office	VIDI 310	

## Textbook and/or Resource Material

None required

## Grading Policies

### Graded Products

- Team Project I (100 points)
- Team Project II (100 points)
- Team Project III (100 points)
- Team Project IV (100 points)
- Scientific Review of Peers (100 points)

*Scaling grades of Team Products.* Working in a team to produce research and communicate the results is half the challenge of research. You are therefore expected to fully participate in developing team products. You will have weekly progress reports due every friday. Team projects will be graded based on whether your participation was useful to your team. The points you receive for a project will be weighted by your relative participation in your team, as evaluated by your teammates.

*Scientific Review and Providing Constructive Criticism.* Critically evaluating research products and providing *constructive* criticism is the other the other half of the challenge of research. You are therefore expected to rate and providing constructive feedback to peer projects.

### Grading scale:

>449 points	A
400-449 points	B
350-399 points	C
300-349 points	D
<300 points	F

### **Class Attendance**

The University views class attendance as the responsibility of an individual student. Attendance is essential to complete the course successfully. University rules related to excused and unexcused absences are located on-line at <http://student-rules.tamu.edu/rule07>. **Late work will not be accepted without a University-approved excuse.** Make-up Policy: If an absence is excused, the instructor will either provide the student an opportunity to make up any work that contributes to the final grade or provide a satisfactory alternative by a date agreed upon by the student and instructor. The make-up work must be completed in a timeframe not to exceed 30 calendar days from the last day of the initial absence. The reasons absences are considered excused by the university are listed below. See Student Rule 7 for details (<http://studentrules.tamu.edu/rule07>). The fact that these are university-excused absences does not relieve the student of responsibility for prior notification and documentation. Failure to notify and/or document properly may result in an unexcused absence. Falsification of documentation is a violation of the Honor Code. 1) Participation in an activity that is required for a class and appears on the university authorized activity list at <https://studentactivities.tamu.edu/app/sponsauth/index>. 2) Death or major illness in a student's immediate family. 3) Illness of a dependent family member. 4) Participation in legal proceedings or administrative procedures that require a student's presence. 5) Religious holy day. NOTE: Prior notification is NOT required. 6) Injury or illness that is too severe or contagious for the student to attend class. a) Injury or illness of three or more class days: Student will provide a medical confirmation note from his or her medical provider within one week of the last date of the absence (see Student Rules 7.1.6.1). b) Injury or illness of less than three class days: Student will provide one or both of these (at instructor's discretion), within one week of the last date of the absence: (i) Texas A&M University Explanatory Statement for Absence from Class form available at <http://attendance.tamu.edu> or (ii) Confirmation of visit to a health care professional affirming date and time of visit. 7) Required participation in military duties. 8) Mandatory admission interviews for professional or graduate school that cannot be rescheduled. Other absences may be excused at the discretion of the instructor with prior notification and proper documentation. In cases where prior notification is not feasible (e.g., accident or emergency) the student must provide notification by the end of the second working day after the absence, including an explanation of why notice could not be sent prior to the class.

### **Americans with Disabilities Act (ADA)**

The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please contact Disability Services, currently located in the Disability Services building at the Student Services at White Creek complex on west campus or call 979-845-1637. For additional information, visit <http://disability.tamu.edu>.

### **Special Note Concerning Students with Disabilities and Learning Differences**

Whether or not a student is registered with Disability Services, rooms are available for those who would perform better given quiet to concentrate, and there is flexibility in the computer lab to get up and move around. All attempts have been made to incorporate the principles of "Universal Design" in classroom activities and online resources. Computers are available that can be customized for particular student needs. We expect active participation of all students to help us make the class accessible and inclusive so that the diverse talents of all participants can be fully engaged.

### **Academic Integrity**

"An Aggie does not lie, cheat, or steal, or tolerate those who do."  
For additional information please visit: <http://aggiehonor.tamu.edu>

### **Special Note Regarding Scientific Integrity**

Whether or not a student has satisfied minimal requirements of academic integrity for fairly earning a grade, there are heightened expectations for behavior arising from the special nature of this course. Course activities are focused on the discovery of new knowledge that has the potential for publication in the peer-reviewed literature. Because published original research must be novel, correct, and important, it is necessary to ensure that due diligence is done to identify and give due credit to previously-published research that impacts the claim for novelty, correctness or importance of your results. Furthermore, students must follow scientific standards of a particular society sponsoring a

scientific conference or archival journal that governs whether a contribution to joint work requires co-authorship.

**Course Topics, Calendar of Activities, Major Assignment Dates**

Phase	Week	Due		Topics
Phase 1 Identify a gap in knowledge	1	Tues	08/28	<ul style="list-style-type: none"> <li>• Meet in Vivarium III room 120</li> <li>• Lab-Specific Training</li> <li>• Opening eggs</li> </ul>
		Thur	08/30 Self-Assessment before class: Article	<ul style="list-style-type: none"> <li>• Review potential projects</li> <li>• Start developing preliminary teams</li> </ul>
	2	Tues	09/04 online HazCom	<ul style="list-style-type: none"> <li>• Windowing techniques</li> <li>• Microscopy</li> </ul>
		Thur	09/06 Journal Club Progress Report	<ul style="list-style-type: none"> <li>• Discuss Team Projects</li> <li>• Targeted literature search</li> <li>• Journal Club</li> </ul>
	3	Tues	09/11	<ul style="list-style-type: none"> <li>• Measuring radii</li> <li>• Technique Rotation</li> </ul>
		Thur	09/13 Proj 1 Due Proj 1 Peer Review	<ul style="list-style-type: none"> <li>• Set Teams</li> <li>• Finish Proj 1</li> </ul>
Phase 2 Generate hypotheses	4	Tues	09/18 Scientific Review	<ul style="list-style-type: none"> <li>• Aseptic techniques</li> </ul>
		Thur	09/20 Journal Club Progress Report	<ul style="list-style-type: none"> <li>• Hypothesis testing</li> <li>• Journal Club</li> </ul>
	5	Tues	09/25	<ul style="list-style-type: none"> <li>• Calibration, data acquisition</li> </ul>
		Thur	09/27 Journal Club Progress Report	<ul style="list-style-type: none"> <li>• Novelty, Importance, and correctness</li> <li>• Journal Club</li> </ul>
	6	Tues	10/02	<ul style="list-style-type: none"> <li>• Feasibility Testing</li> </ul>
		Thur	10/04 Proj 2 Due Proj 2 Peer Review	<ul style="list-style-type: none"> <li>• Finish Proj 2</li> </ul>
Phase 3 Design experiment	7	Tues	10/09 Scientific Review	<ul style="list-style-type: none"> <li>• Team Projects</li> </ul>
		Thur	10/11 Journal Club Progress Report	<ul style="list-style-type: none"> <li>• Journal Club</li> </ul>
	8	Tues	10/16	<ul style="list-style-type: none"> <li>• Team Projects</li> </ul>
		Thur	10/18 Journal Club Progress Report	<ul style="list-style-type: none"> <li>• Journal Club</li> </ul>
	9	Tues	10/23	<ul style="list-style-type: none"> <li>• Team Projects</li> </ul>
		Thur	10/25 Journal Club Progress Report	<ul style="list-style-type: none"> <li>• Journal Club</li> </ul>
	10	Tues	10/30	<ul style="list-style-type: none"> <li>• Team Projects</li> </ul>
		Thur	11/01 Proj 3 Due Proj 3 Peer Review	<ul style="list-style-type: none"> <li>• Finish Proj 3</li> </ul>
Phase 4 Evaluate experiment design	11	Tues	11/06 Scientific Review	<ul style="list-style-type: none"> <li>• Team Projects</li> </ul>
		Thur	11/08 Journal Club Progress Report	<ul style="list-style-type: none"> <li>• Journal Club</li> </ul>
	12	Tues	11/13	<ul style="list-style-type: none"> <li>• Team Projects</li> </ul>

	Thur	11/15 Journal Club Progress Report	• Journal Club
13	Tues	11/20	• Team Projects
	Thur	11/22 Thanksgiving	
14	Tues	11/27	• Team Projects
	Thur	11/29 Journal Club Progress Report	• Journal Club
	Tues	12/04 Proj 4 Due Proj 4 Peer Review	• Optional Lab
	Thur	12/06 Reading Day	

### Useful Dates:

October 3, 2018: TAMU Research Expo  
 Mid-November: Abstract deadline for EB conference  
 Mid-April: Abstract Deadline for BMES conference

### Other Pertinent Course Information

#### Team Projects

Team projects are developed to generate new knowledge. The four projects together will develop research suitable for formal presentation at a physiology conference.

FIRST TEAM PROJECT (Phase I) IDENTIFY THE GAP IN KNOWLEDGE: Perform literature search to understand key concepts and identify opportunities to make discoveries that can be addressed with the in vitro setup available in the lab.

Products: Annotated bibliography (75 pts); Journal club forms (25 points); Scientific Review (33 pts)

SECOND TEAM PROJECT (Phase II) GENERATE HYPOTHESES: Critically evaluate the literature to develop a hypothesis that can be addressed with the in vitro setup available in the lab. Form an argument using literature that the proposed project is novel, important and feasible.

Products: Conference-style presentation in Google Slides that succinctly presents your hypothesis and justification of novelty, importance and feasibility of your project (50); updated annotated bibliography (25); Journal club forms (25); Scientific Review (33 pts)

THIRD TEAM PROJECT (Phase III) DESIGN EXPERIMENT: Plan an experimental study and develop a detailed protocol to generate data to validate your hypothesis.

Products: Detailed experimental protocol including references and justification where necessary; expected results (75 pts); updated annotated bibliography (25 pts); Scientific Review (33 pts)

FOURTH TEAM PROJECT (Phase IV) EVALUATE EXPERIMENTAL DESIGN: Perform preliminary experiments and refine experimental protocol.

Products: 1-page abstract suitable for submission to a national conference (50 pts); revised hypothesis, project justification, experimental protocol, expected results (25 pts); updated annotated bibliography (25 pts)

