Syllabus

NEUR 702

Research Methods

Fall Semester 2021

Weekly schedule: Each week runs from Monday (12:01 am) to Sunday (11:59 pm) starting Aug. 23, 2021.

Instructor: Frank Krueger, Ph.D.

Department: School of Systems Biology

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Office Hours: By appointment (via Zoom)

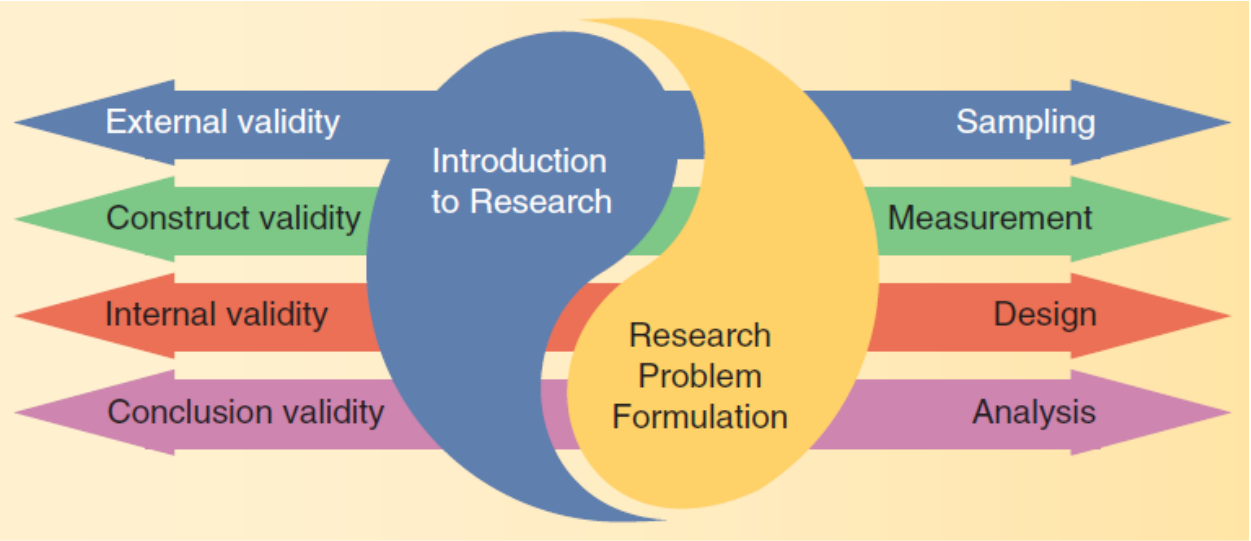
Course Description

In this course, students will learn about the fundamental steps of a *research road map* that underlie all research —consisting of interconnected research processes such as problem formulation, sampling, measurement, design, analysis, and conclusion. Furthermore, students will get introduced to the Yin and the Yang of research —stressing the inherent complementarities of theory and practice of research— to become better researchers. Finally, students will develop their research project, provide constructive peer feedback to their fellow students related to their research project, and apply fundamental principles of research methods bringing theory (i.e., introduction to research) and practice (i.e., research problem formulation) together.

The course consists of *five building blocks* that serve as key components for an introduction into the field of research methods:

- **Building bock 1** provides an *introduction to research methods*, including foundations of research enterprise (e.g., conceptualizing, language, structure, and validity of research), ethics (historical cases of unethical research, evolution of modern system of research ethics, and ethics in the production and publication of scholarly work), and qualitative approaches (e.g., context for qualitative research, qualitative methods and data, and assessing qualitative research).
- **Building bock 2** offers an *introduction to sampling*, such as foundations of sampling (e.g., terminology, sampling methods, and theories of non- and probability sampling).
- **Building bock 3** presents an *introduction to measurement*, dealing with foundations of measurement (e.g., levels of measurement, quality of measurement, integration of reliability and validity), scales, tests, indexes (e.g., the purpose of scaling, test construction, constructing, and index), and survey research (e.g., survey methods, survey design, and interviews).

- **Building bock 4** includes an *introduction to design*, incorporating foundations of design (e.g., research design and causality, developing a research design, and types of designs), experimental design (e.g., classifying experimental designs, factorial designs, and randomized blocked designs), and quasi-experimental design (e.g., nonequivalent group design, regression-discontinuity design, and other quasi-experimental designs).
- **Building block 5** offers an *introduction to analysis and reporting*, compromising the foundation of data analysis (e.g., conclusion validity, data preparation, and descriptive statistics), inferential analysis (e.g., general linear model, experimental analysis, and quasi-experimental analysis), and research communication (e.g., written reports, presentations, and posters).



The Yin and Yang of Research (Trochim et al., 2016, p. xv)

Learning outcomes

By the end of this course, students will be able to:

1. Understand the principles of the research road map (e.g., problem formulation, sampling, measurement, design, analysis, and conclusion);
2. Comprehend the inherent complementarities of theory and practice of research to become a better researcher,
3. Develop a research project in their field of study by applying the learned knowledge about research methods; and
4. Use software tools to conduct a literature review, write a research project, and present a research project.

Prerequisite

Prerequisites are the completion or concurrent enrollment in all other required general education courses or permission of the instructor.

Course Materials

Required Texts: Trochim W, Donnelly JP, Arora K. *Research Methods: The Essential Knowledge Base***.** Cengage.

Course Logistics

This course will use a distance learning format; the primary meeting space will be on Blackboard 9.1; and we will use other means of keeping in touch such as e-mail, telephone, and Blackboard Collaborate Ultra/ Zoom. This is a rigorous course: you will accomplish the following activities in a typical week:

- reading about 35-50 pages, reflecting the content, and discussing the material with your classmates;
- completing online activities and responding to weekly requirements; and
- working on assignments completing in Blackboard according to the assignment schedule.

Though the delivery method is different, it should take you the same amount of time as a typical full-semester course. You should **expect to spend approximately 9 hours on coursework each week** (including the time you would have spent in a classroom). It is critical to keep up with weekly requirements. Each week, I will provide announcements via e-mail and a module in our Blackboard course to specify required activities and assignments (available by clicking on 'Weekly Modules' on the course menu in Blackboard).

Blackboard (Available on Aug. 23, 2021)

We will use Blackboard 9.1 for the course. Additional guidance on individual assignments and discussion questions will be posted there. All assignments will be submitted through Blackboard for grading. Please visit our Blackboard site regularly.

Access Blackboard 9.1 by following these steps:

1. Go to http://mymason.gmu.edu.
2. Login using your NETID and password.
3. Click on the 'Courses' tab.
4. Click on 'Neurobiology of Decision-Making (NEUR 592| BIOL 691| BINF 739 (Fall 2021)' under the 'Course List' heading.

Instructor-Student Communication

I will respond to your e-mails from Monday (9 am) through Friday (6 pm) within 24 hours. If I am away from e-mail for more than two days, I will send an announcement to the class.

Before sending an e-mail with questions, please check the following (available on your Blackboard course menu) **unless the e-mail is of a personal nature**:

1. Syllabus.
2. Ask the Professor (Feel free to respond to other students in the Help forum if you know the answer.).
3. Blackboard Tutorials on how to use Blackboard features.
4. Blackboard Q&A (resources specific to Mason).
5. Technology Requirements.

Mason E-MAIL

- Mason requires that Mason e-mail be used for all courses. I will be sending messages to your Mason e-mail, and you are responsible for ensuring you have access to these messages.
- You may forward your Mason e-mail to other accounts but always use your Mason e-mail when communicating with me to verify your identity.
- You must regularly check your Mason e-mail account and keep your mailbox maintained so that messages are not rejected for being over quota.
- When you e-mail me, you can expect a response within 24 hours (*Monday through Friday*). If I am going to be away from e-mail for more than two days, I will send an announcement to the class.
- When you e-mail me, be sure to include '**Research Methods**' at the beginning of the subject heading to alert me that I have received a message from one of my online students.

Participation

Netiquette For Online Discussions

Our discussion should be collaborative, not combative; you create a learning environment, share information, and learn from one another. Respectful communication is essential to your success in this course and as a professional. Please re-read your responses carefully before you post them so others will not take them out of context or as personal attacks. Be positive to others and diplomatic with your words, and I will try my best to do the same. Be careful when using sarcasm and humor. Without face-to-face communication, your joke may be viewed as criticism. Experience shows that even an innocent remark in the online environment can be easily misconstrued.

Netiquette prepared by Charlene Douglas, Associate Professor, College of Health & Human Services, GMU.

Technology Requirements

Technology requirements for the course are:

- Internet connection (DSL, LAN, or cable connection desirable).
- Supported Web browser (e.g., Internet Explorer, Chrome, Safari) to use Adobe Connect for Live Class Sessions.
- MS Office 365 ProPlus is provided at no cost via the Microsoft Student Advantage Program (Access is tied to your @gmu.edu e-mail address).

Student Responsibilities

Mason E-mail

Students are responsible for the content of university communications sent to their George Mason University e-mail account and are required to activate their account and check it regularly. For accessibility and privacy, the university, school, and program will send communications to students solely through their Mason e-mail account —students should respond accordingly.

Patriot Pass

Once you sign up for your Patriot Pass, your passwords will be synchronized, and you will use your Patriot Pass username and password to log in to the following systems: Blackboard, University Libraries, Mason E-Mail, myMason, Patriot Web, Virtual Computing Lab, and WEMS. [See https://password.gmu.edu/index.jsp].

Students with Disabilities

Students with disabilities who seek accommodations in a course must be registered with the George Mason University Office of Disability Services (ODS) and inform their instructor, in writing, at the beginning of the semester (See Office of Disability Services).

Academic Integrity

Students must be responsible for their work, and students and faculty must take on the responsibility of dealing explicitly with violations. The tenet must be the foundation of our university culture. [See https://oai.gmu.edu/].

Honor Code and Virtual Classroom Conduct

Students must adhere to the guidelines of the George Mason University Honor Code (See Honor Code).

We value critical thinking, and therefore, students must read the assigned material (e.g., books, articles) before the class with a critical eye. Active thought, quality of inputs, and a conflict resolution attitude should be your guiding principles.

The principle of academic integrity is taken very seriously, and violations are treated gravely. What does academic integrity mean in this course? Essentially this: when you are responsible for a task, you will perform that task. When you rely on someone else's work in an aspect of the performance of that task, you will give full credit in the proper, accepted form.

Another aspect of academic integrity is the free play of ideas. Vigorous discussion and debate are encouraged in this course, with the firm expectation that all aspects of the class will be conducted with civility and respect for differing ideas, perspectives, and traditions. When in doubt (of any kind), please ask for guidance and clarification.

Plagiarism is the equivalent of intellectual robbery and cannot be tolerated in the academic setting. If you have any doubts about what constitutes plagiarism, please contact me.

University Policies

Students must follow university policies [See University Policies].

Responsible Use of Computing

Students must follow the university policy for Responsible Use of Computing [See http://universitypolicy.gmu.edu/policies/responsible-use-of-computing].

University Calendar

Details regarding the current Academic Calendar [See https://registrar.gmu.edu/calendars/].

University Catalog

The current university catalog [See University Catalog].

Student Services

Writing Center

The George Mason University Writing Center staff provides various resources and services (e.g., tutoring, workshops, writing guides, handbooks) intended to support students as they work to construct and share knowledge through writing (See Writing Center). ESL Help: The program was designed specifically for students whose first language is not English who feel they might benefit from additional, targeted support throughout an entire semester (See Writing Center).

University Libraries

University Libraries provide resources for distance students. (See http://library.gmu.edu/for/online).

Counseling and Psychological Services

The George Mason University Counseling and Psychological Services (CAPS) staff consists of professional counseling and clinical psychologists, social workers, and counselors who offer a wide range of services (e.g., individual and group counseling, workshops, and outreach programs) to enhance students' personal experience and academic performance [See http://caps.gmu.edu].

Family Educational Rights and Privacy Act (FERPA)

The Family Educational Rights and Privacy Act of 1974 (FERPA), also known as the 'Buckley Amendment,' is a federal law protecting student educational records and providing students with certain rights. [See http://registrar.gmu.edu/privacy].

Weekly Schedule

Distance learning courses are dynamic—to ensure we achieve our learning outcomes— we may need to negotiate weekly schedule changes. We will focus on learning, fairness, and reason for any approved changes. Each week's activities —reading assignments about topics, testing your knowledge about research methods (via a quiz), sharing, and discussing your knowledge with classmates (via discussion forum), and writing your research project utilizing different software tools— **require approximately 9 hours.**

The table below lists the weekly schedule, major activities, major assignments, points, and due dates for this course. Final grades will be based on the total number of points earned in the class.

Weeks	Major Topics and Method	Assignments (graded)	Points	Due Date
Week 1 Monday, Aug. 23 - Sunday, Aug. 29	PART 1: FOUNDATIONS Foundations of Research Methods Research Project	Topic: Discussion (Part 1) Topic: Glossary Topic: Quiz Topic: Discussion (Part 2) Project: How to use Word Software Package Orientation Quiz	5 5 5 5 10 5	Wednesday, 8/25 Sunday, 8/29
Week 2 Monday, Aug. 30 — Sunday, Sept. 5	PART 1: FOUNDATIONS Ethics Research Project	Topic: Discussion (Part 1) Topic: Glossary Topic: Quiz Project: Feedback Topic: Discussion (Part 2) Project: Ethics Project: Revision	5 5 5 5 5 10 5	Wednesday, 9/1 Sunday, 9/5
Week 3 Monday, Sept. 6 — Sunday, Sept. 12	PART 1: FOUNDATIONS Ethics Research Project	Topic: Discussion (Part 1) Topic: Glossary Topic: Quiz Project: Feedback Topic: Discussion (Part 2) Project: How to use Zotero Software Package Project: Revision	5 5 5 5 5 10 5	Wednesday, 9/1 Sunday, 9/5
Week 4 Monday, Sept. 13 — Sunday, Sept. 19	PART 2: SAMPLING Sampling Research Project	Topic: Discussion (Part 1) Topic: Glossary Topic: Quiz Project: Feedback Topic: Discussion (Part 2) Project: Background Project: Revision	5 5 5 5 5 10 5	Wednesday, 9/15 Sunday, 9/19
Week 5 Monday, Sept. 20 — Sunday, Sept. 26	PART 3: MEASUREMENT Introduction to Measurement Research Project	Topic: Discussion (Part 1) Topic: Glossary Topic: Quiz Project: Feedback Topic: Discussion (Part 2) Project: Gap of Knowledge Project: Revision	5 5 5 5 5 10 5	Wednesday, 9/22 Sunday, 9/26
Week 6 Monday, Sept. 27 — Sunday, Oct. 3	PART 3: MEASUREMENT Scales, Tests, and Indexes Research Project	Topic: Discussion (Part 1) Topic: Glossary Topic: Quiz Project: Feedback Topic: Discussion (Part 2) Project: Goal	5 5 5 5 5 10	Wednesday, 9/29 Sunday, 10/3

		Project: Revision	5	
Week 7 Monday, Oct. 4 — Sunday, Oct. 10	PART 3: MEASUREMENT Survey Research Research Project	Topic: Discussion (Part 1) Topic: Glossary Topic: Quiz Project: Feedback Topic: Discussion (Part 2) Project: Hypothesis Project: Revision	5 5 5 5 5 10 5	Wednesday, 10/6 Sunday, 10/10
Week 8 Monday, Oct. 11 — Sunday, Oct. 17	PART 4: DESIGN Introduction to Experimental Design Research Project	Topic: Discussion (Part 1) Topic: Glossary Topic: Quiz Project: Feedback Topic: Discussion (Part 2) Project: Sample Project: Revision	5 5 5 5 5 10 5	Wednesday, 10/13 Sunday, 10/17
Week 9 Monday, Oct. 18 — Sunday, Oct. 24	PART 4: DESIGN Experimental Design Research Project	Topic: Discussion (Part 1) Topic: Glossary Topic: Quiz Project: Feedback Topic: Discussion (Part 2) Project: How to use PowerPoint Software Package Project: Revision	5 5 5 5 5 10 5	Wednesday, 10/20 Sunday, 10/24
Week 10 Monday, Oct. 25 — Sunday, Oct. 31	PART 4: DESIGN Quasi-Experimental Design Research Project	Topic: Discussion (Part 1) Topic: Glossary Topic: Quiz Project: Feedback Topic: Discussion (Part 2) Project: Experimental Design Project: Revision	5 5 5 5 5 10 5	Wednesday, 10/27 Sunday, 10/31
Week 11 Monday, Nov. 1 — Sunday, Nov. 7	PART 5: ANALYSIS AND REPORTING Introduction to Data Analysis Research Project	Topic: Discussion (Part 1) Topic: Glossary Topic: Quiz Project: Feedback Topic: Discussion (Part 2) Project: Structuring Presentation Project: Revision	5 5 5 5 5 15 5	Wednesday, 11/3 Sunday, 11/7
Week 12 Monday, Nov. 8 — Sunday, Nov. 14	PART 5: ANALYSIS AND REPORTING Inferential Analysis Research Project	Topic: Discussion (Part 1) Topic: Glossary Topic: Quiz Project: Feedback Topic: Discussion (Part 2) Project: Data Analysis Project: Revision	5 5 5 5 5 10 5	Wednesday, 11/10 Sunday, 11/14

Week 13 Monday, Nov. 15 — Sunday, Nov. 21	PART 5: ANALYSIS AND REPORTING Research Communication Research Project	Topic: Discussion (Part 1) Topic: Glossary Topic: Quiz Project: Feedback Topic: Discussion (Part 2) Project: Creating Presentation Project: Revision Course Evaluation	5 5 5 5 5 15 5 15	Wednesday, 11/17 Sunday, 11/21
Week Monday, Nov. 22 — Sunday, Nov. 28	Thanksgiving Recess			
Week 14 Monday, Nov. 29 — Sunday, Dec. 5	PART 6: RESEARCH PROJECT	Project: Submission Project Project: Feedback Project: Giving Presentation	20 5 35	Wednesday, 12/1 Sunday, 12/5
			Total 600	

Grading Scale (points)

Final grades assigned for this course will be based on the percentage of total points earned and are assigned as follows:

Letter Grade	Percentage	Points	Performance
A^+	98-100%	583-600	Superb Work
A	93-97%	558-582	Excellent Work
A^-	90-92%	540-557	Nearly Excellent Work
B^+	87-89%	522-539	Very Good Work
B	83-86%	498-521	Good Work
B^-	80-82%	480-497	Mostly Good Work
N/A	<80%	<480	Failing Work