

Department of Emergency Medicine  
Alpert Medical School of Brown University  
Providence, RI 02903-4923

**Research Curriculum Course**

<https://canvas.brown.edu/courses/1071082>

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As part of a dedicated and formal effort to have a concise uniform research education for various fellowships and the residency program under the Department of Emergency Medicine, this curriculum is designed. The sessions will also be available to other Departments and the Alpert Medical School of Brown University.

**Main Objectives:**

To develop an understanding of:

1. The principles of conducting and reviewing academic research
2. How to design and defend a study
3. Various analytical tools for data presentation
4. How to write a quality manuscript in a timely manner
5. Ethical principals in conducting research

**Course Duration and Format:**

Various discussion sessions will be conducted on a quarterly basis with four sessions spread over an academic year. Presenters are encouraged to make it a live discussion format as much as possible. There may be pre-class reading material or tasks to further aid in learning or cover the areas that will not be discussed in these sessions as considered important by the presenters.

*Please also note on each of these session days, following the research sessions, there will be Fellows Career Development Discussions from 130 pm -330 pm.*

- 1) **Monday, September 17<sup>th</sup>, 2018** | 9:30 am – 1:30 pm (Research Session) | 1:30 pm- 3:30 pm (Fellows Career Development Discussions)
- 2) **Monday, December 10<sup>th</sup>, 2018** | 9:30 am – 1:30 pm (Research Session) | 1:30 pm- 3:30 pm (Fellows Career Development Discussions)
- 3) **Monday, February 11<sup>th</sup>, 2019** | 9:30 am – 1:30 pm (Research Session) | 1:30 pm- 3:30 pm (Fellows Career Development Discussions)
- 4) **Monday, April 8<sup>th</sup>, 2019** | 9:30 am – 1:30 pm (Research Session) | 1:30 pm- 3:30 pm (Fellows Career Development Discussions)

**Location: Conference Room 245, 55 Claverick Street, Providence, RI 02903**

**Session 1 | September 17<sup>th</sup>, 2018 | 9:30 am – 1:30 pm | Claverick 245**

9:30 am – 10:30 am

**Conducting Research**

- a. How to forge a constructive mentor/mentee relationship
- b. Detecting and managing conflicts of interest in research
- c. Understanding the complexities of collaborative research
  - i. Defining complex roles and responsibilities
  - ii. Managing differing interests, cultural differences, differing regulatory and institutional requirements
  - iii. Execution of MTA's and MOU's
- d. Defining data ownership and sharing
  - i. Who has the ability to control information: to create, access, modify, package, derive benefit from, sell, or remove data and assign these privileges to others?
  - ii. Industry sponsors and ownership of data

Instructor(s): Lisa Merck, MD, MPH and Gregory Jay, MD, PhD

10:30 am – 11:30 am

**Designing a Study**

- a. How to formulate and defend a study question
- b. Understand hypothesis generation and defining study objectives
- c. Literature search: use of reference software
- d. How to define methodology
- e. Understand the advantages and limitations of various study types based on the study question
  - i. Descriptive/Observational/Case series
  - ii. Case-Control, Cohort: Prospective and Retrospective
  - iii. Randomized Control Trials
  - iv. Phase 1-4 studies

Instructor(s): Francesca Beaudoin, MD, PhD

11:30 am – 12:30 pm

**Understanding Bias, Limitations and Confounders**

- a. Understand various limitations and bias inherent to study design and introduced by researchers
- b. Understanding confounders and effect on risk assessments
- c. Methods to control for confounders and measurement of effect
- d. Ways to assess risk while controlling for confounders (mediators, moderators, confounders)

Instructor(s): Tracy Madsen, MD, ScM and Mark Zonfrillo, MD, MSCE

12:30 pm – 1:30 pm

**Predictive Modeling**

- a. Predictive Modeling in health care
- b. Understanding of how clinical prediction models are established
- c. How to interpret clinical prediction model

Instructor(s): Adam Levine, MD

**Session 2 | December 10<sup>th</sup>, 2018 | 9:30 am – 1:30 pm | Claverick 245**

9:30 am – 10:30 am

**Association**

- a. Regression analysis for continuous, binomial and categorical data
- b. Basic concepts of survival analysis

Instructor(s): Dale Steele, MD, MS

10:30 am – 11:30 am

**Sampling Designs and Statistical Tools for Data Analysis**

- a. Identifying the population of interest and appropriate sample methodology
- b. Sample size calculations, limitations, inclusion and exclusion criteria
- c. Statistical tools for sample size estimation
- d. Statistical tools and applications for data analysis
- e. Planning and designing study analysis before data collection
- f. Data collection, variables of interest, coding and entering

Instructor(s): Janette Baird, PhD and Thomas Chun, MD, MPH

11:30 am – 12:30 pm

**REDCap: Introduction to Online Tool for Data Collection and Analysis**

<https://projectredcap.org/>

<https://projectredcap.org/resources/videos/>

- a) Become familiar with the uses and potential applications of REDCap as a data collection tool.
- b) Structuring your REDCap project around a testable hypothesis
- c) Using REDCap features to achieve best practices for structuring and formatting data for analysis
- d) Navigate the features of REDCap to build a custom data base and send a survey
- e) How to get help building your database

Instructor(s): Alison B Chambers, PhD

12:30 pm – 1:30 pm

**Risk Assessment**

- a. Understand the concept of risk assessment to determine association
- b. Use of various risk estimates based on study types
- c. Utility and methods of calculation of odds ratio, relative risk, hazard ratios
- d. Attributable risks
- e. Understanding difference between association and causality

Instructor(s): Siraj Amanullah, MD, MPH

**Session 3 | February 11<sup>th</sup>, 2019 | 9:30 am – 1:30 pm | Claverick 245**

9:30 am – 10:30 am

**Survey Designs**

- a. Understand the utility of surveys for various study designs
- b. Designing surveys, creating instrument and administration
- c. Sample size estimation for survey design
- d. Validation of survey, analysis, and presentation of results

Instructor(s): Janette Baird, PhD

10:30 am – 11:30 am

**Analysis of Data and Presentation of Results**

- a. Presentation of study population: demographics and differences between groups
- b. Presentation of basic data and types of variables (ordinal, nominal, discrete, categorical, and continuous)
- c. Understanding the various statistical methods for continuous and categorical data
- d. Use of chi square statistics, t-test, Wilcoxon rank test, ANOVA test
- e. Use of p-value as a test of significance

Instructor(s): Stephanie Ruest MD, MPH; Robyn Wing, MD, MPH

11:30 am – 12:30 pm

**Statistical Tests of Probability**

- a. Understand probability assessment of various clinical tests
- b. Sensitivity, specificity, false negative and positive rates
- c. Negative and positive predictive values
- d. ROC and Area Under the Curve
- e. Likelihood Ratios: When are they important to report?
- f. What is best to use based on the type of study?: Sensitivity/specificity compared to likelihood ratios

Instructor(s): Rebecca Karb MD, PhD

12:30 pm – 1:30 pm

**Qualitative Research**

- a. Understand the utility of qualitative research
- b. Designing a qualitative research study
- c. Analysis and presentation of qualitative research results

Instructor(s): Aris Garro, MD, MPH

**Session 4 | April 8<sup>th</sup>, 2019 | 9:30 am – 1:30 pm | Claverick 245**

- 9:30 am – 10:45 am      **Online Resources and Software for Manuscript Writing**
- a. Using Medline search for literature search to justify a study
  - b. Transferring abstracts to various reference software - EndNote / Refworks
  - c. Using reference software in manuscript writing
  - d. Hands-on learning experience format

Instructor(s): Chris Merritt, MD, MPH

- 10:45 am – 11:30 am      **Large Data Set Studies**
- Understanding large data set studies by an example.
- i. Understand the utility of large data sets for study designs
  - ii. Various methodologies to use large data sets and extraction of variable of interests
  - iii. Analysis and presentation of results
  - iv. Defining limitations associated with large data sets
  - v. Examples of national large data sets available online

Instructor(s): Elizabeth Goldberg, MD

- 11:30 am – 12:30 pm      **Writing a Quality Manuscript**
- a. How to summarize research in an abstract
  - b. Defining need for the study in introduction
  - c. Describing research methods for reproducibility
  - d. Presentation of results related to study hypothesis
  - e. Discussion of major study findings without repeating results but more a continuum and likely explanation of study findings in lieu of available literature
  - f. Closing the discussion with limitations and future directions
  - g. Authorship guidelines and publication ethics
  - h. Peer review: standards of conduct by references that journals typically expect

Instructor(s): Elizabeth Goldberg, MD and Michael Mello, MD, MPH

- 12:30 pm – 1:30 pm      **Ethics in Conducting Clinical Research**
- Session will be in a question answer format based on the queries by participants. These includes but not limited to
- a. Human subject research policies and guidelines
    - i. Informed consent, assent, dissent, EFIC
    - ii. Vulnerable populations
  - b. Certificates of Confidentiality
  - c. Ethical considerations in technology based research

Instructor(s): Jheraldines Paulino and Erin Ryan, MPH