

# Jumping into Statistics: Introduction to Study Design and Statistical Analysis for Medical Research Using JMP Pro Statistical Software

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# Meet the Instructors

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# Course Objectives

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- Review fundamentals of study design and research methodology
- Understand how to choose best statistical test for your research question
- Practice basic statistical analysis use JMP Pro Software

# Course Topics

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- Asking a Good Research Question
- Life Cycle of Research and Scientific Method
- Study Design
- Data types and Database Construction
- Descriptive Statistics
- Data Visualization
- Population and Sample, Probability, Statistical Inference
- How to Chose Correct Statistical Method and Run Some Analyses
  - T-tests, ANOVA, Non-Parametric
  - Chi-square, odds ratio, relative risk
  - Regression and Correlation
  - Survival Analysis
  - Test Diagnostics (e.g. sensitivity, specificity, etc.)
- Comparing Statistical Modeling and Machine Learning

# How to Ask a Good Research Question

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# Why is it important?

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- Identify gaps in knowledge
- Focus your research
- Develop testable objectives and hypotheses

A good research question should essentially be a guide to your project

# How to formulate a good research question?

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- **FINER** → overarching framework
  - Feasible, Interesting, Novel, Ethical, Relevant
- **PICO(T)** → operationalize (testable)
  - Population, Intervention, Comparison, Outcome, (Timing)

\*Complimentary methods\*

## Feasible

- Sample size, expertise, time and money
- Manageable Scope

## Interesting

- Intrigues investigators, peers, community

## Novel

- Confirms, refutes, or extends previous findings

## Ethical

- Likely approved by IRB/IACUC

## Relevant

- To scientific knowledge, clinical/health policy, future research



## Population

- Who are your patients?
- Gender, age, ethnicity, medical history

## Intervention

- Studying effect of what?
- Drug, procedure, behavior, condition, risk factor exposure

## Comparison

- What is comparison/control group?
- Placebo, no treatment, standard of care, no exposure

## Outcome

- Measure that may be affected by intervention?
- Disease occurrence, progression, improvement, mortality, efficacy

## Timing

- Over what time frame will study take place?

# Summary Tips

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- Perform thorough literature review
- Examine current trends and technological advances in topic
- Seek input from experts, colleagues, mentors, and collaborators to refine ideas
- Use FINER to develop research question
- Focus question with PICOT to develop testable question
- Develop research hypothesis (later lecture)
- Develop clear, well-defined primary and secondary (if needed) aims
- Before beginning study, re-review to ensure question and objectives are answerable, feasible, and relevant

# References

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Farrugia P, Petrisor BA, Farrokhyar F, Bhandari M. Research questions, hypotheses and objectives. Canadian journal of surgery. 2010 Aug;53(4):278.

# JMP Pro!

<https://software.ufl.edu/>

The screenshot shows a web browser window with the URL [software.ufl.edu/software-listings/sas-jmp.html](https://software.ufl.edu/software-listings/sas-jmp.html). The browser's address bar and tabs are visible at the top. Below the browser, the website's navigation bar is shown, featuring the University of Florida (UF) logo and a menu with items: NEWS, CALENDAR, OFFICES & SERVICES, DIRECTORY, GIVING, UF HEALTH, UF IFAS, and a 'Welcome' button. The main content area has a sub-navigation bar with 'SOFTWARE LISTINGS', 'LIAISON DASHBOARD', and 'CONTACT US'. Below this, a secondary navigation bar highlights 'DOWNLOAD' among other options: ABOUT, DETAILS, DOWNLOAD, SUPPORT, and ASK A QUESTION. The main text area is titled 'Software' and contains the following information:

SAS JMP distributes license keys for the past 3 versions of SAS JMP and SAS JMP Pro. This gives the departments the latitude to schedule their upgrades according to its needs.

Select the link below to obtain SAS JMP OR SAS JMP Pro license keys for versions: v13.2, v14.2, and v15.0.

- [SAS JMP License keys](#)

SAS JMP 15.0 and [SAS JMP Pro 15.0](#) installation files and license keys are distributed together in one installation archive (depot)

- [SAS JMP Installation files](#)