



Al-Mustaqbal University

College of Science



Scientific Thinking and Research Skills

Third Year Students / 1st Semester

INTRODUCTION TO RESEARCH METHODOLOGY, *continued*

2025-2026

Biochemistry Department

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Characteristics of Scientific Research -

Accuracy & Confidence

- Accuracy refers to the closeness of the findings to reality (e.g. $g = 9.8 \text{ m/s}^2$)
- Confidence refers to the probability that our estimations are correct.



Characteristics of Scientific Research - **Objectivity**

Conclusions drawn from the analysis of data must be objective. It is proved from development of data and **Supported by the theoretical model.**



Characteristics of Scientific Research - **Generalizability**

Scope of applicability:

- The wider, and better in the applicability,
For example (e. g.) [Rate Equation Model](#) applicable for lasers and fibre amplifiers systems.

Rate equation modeling

by Dr. Rüdiger Paschotta

Rate equation modeling is a method of modeling the dynamics of laser gain media with differential equations for level populations.



Characteristics of Scientific Research – **Thrift (cost-effective)**

1. The Fact is straight-forward.
2. Simplicity in explaining the phenomena or problem.
3. Assumptions are critical.
4. Minimize the dependent variables .



High Quality Research



- It is based on the work of others.
- It can be replicated (duplicated).
- It is generalizable to other settings.
- It is based on some logical rationale and tied to theory.
- It is achievable!
- It generates new questions or is cyclical in nature.
- It is an apolitical activity that should be undertaken for the improvement of society.



What is Bad Research?

- The opposites of what has been discussed.
- Looking for something when it simply is not to be found.
- Plagiarizing other people's work.
- Falsifying data to prove a point.
- Misrepresenting information and misleading participants.



What Isn't Research

- Playing with technology (neglecting fundamentals)
- Book report.
- Programming project.
- Doing what others have already done.

However, some of these points can be done as part of a research.



Questions ?



Thanks