Introduction to Research:

Upward Bound Math & Science
University of Texas at Arlington
Dr. Adrian Rodriguez
Sample paper examples

• Research paper examples
  • Conference paper
  • Journal paper
Key parts of a paper

- Title
- Author name(s), affiliation(s), and contact info
- Abstract
- Key words: 3-5 words is standard
- Intro/Background: Literature review
- Details of your work:
  - Theory: equations and/or principles
  - Approach, formulation
  - Method of solution
- Presentation of results (tables, figures, etc.)
- Conclusions
- References
Group Discussion

• **Question**: What is a research topic and how do I select one?
Group Discussion

- **Question**: What is a research topic and how do I select one?

- **source: umflint.edu**
  - brainstorm for ideas
  - choose a topic that will enable you to read and understand the literature
  - ensure that the topic is manageable and that material is available
  - make a list of key words [that characterize your topic]
  - define your topic as a focused research question
  - research and read [in depth] about your topic
  - formulate an [abstract] statement
Research topics

<table>
<thead>
<tr>
<th>Nanotechnology</th>
<th>Flexible electronics</th>
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<tbody>
<tr>
<td>Tissue engineering</td>
<td>Advancement of industrial machinery</td>
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<tr>
<td>DNA structure</td>
<td>Stem cells</td>
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<tr>
<td>Artificial intelligence</td>
<td>Motor proteins</td>
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<td>Cyber security</td>
<td>The golden ratio</td>
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<td>Energy efficient cars</td>
<td>Black holes</td>
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<td>Neural networks</td>
<td>Contact and impact dynamics</td>
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<td>Humanoid robots</td>
<td>Addiction</td>
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<td>Green technology</td>
<td>Vehicle for Mars</td>
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<td>Commercial space vehicles</td>
<td>Monte Carlo methods</td>
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<tr>
<td>Global warming</td>
<td>3D printing</td>
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</table>
Scientific Method

1. Formulate question/problem/topic
2. Create a hypothesis
3. Gather data to test hypothesis/predictions
4. Develop general theories about topic
5. Test your theories
6. Analyze results
7. Draw conclusions
Literature Review

- Start with a broad search about your topic
  - This should cover the general study of your topic
  - Collect references
- Narrow your search and identify key parts (3-5) about your topic
  - For example: bridge design
    - Types: suspension, arch, etc.
    - Design: truss, simply supported, etc.
    - Material selection: steel, wooden, etc.
  - Collect references again
- If possible, narrow your search further and target 1-2 specific details that contribute the most to the existing literature
  - Collect references one last time
Building a “research toolbox”
Building a “research toolbox”

- Initial broad search
  - Bridge Design
  - Type: Suspension, Arch, Truss
  - Design: Simply Supported, Steel
  - Material Selection
Group Discussion

• **Question:** What does plagiarism mean to you?
Citation styles

- APA – American Psychological Association
  - Education
  - Psychology
  - Sciences
- MLA – Modern Language Association
  - Humanities (human culture studies)
- AMA – American Medical Association
- Chicago/Turabian
  - Business
  - History
  - Fine Arts
- IEEE – Institute for Electrical and Electronics Engineers
  - Engineering
  - Sciences
IEEE style

- Further documentation
  - http://pitt.libguides.com/citationhelp
Abstract Writing

• *def.* a summary of the contents of a book, article, or formal speech.

• Examples:
  • Conference paper
  • Journal paper
Abstract Writing

- Parts of an abstract
  1. Summarizes what the paper researches, how the topic is studied, and the examples to be tested/considered (2-3 sentences)
  2. Briefly discusses the results (1-2 sentences)
  3. States the expected major conclusions (1 sentence).
Abstract Writing

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Abstract Writing

• Parts of an abstract

1. Summarizes what the paper researches, how it is studied, and the examples to be tested/considered (2-3 sentences)
2. Briefly discusses the results (1-2 sentences)
3. States the expected major conclusions (1 sentence)

This work uses a new discrete approach to analyze the stick-slip transition of Newton’s cradle with frictional contact. The consideration of friction here leads to a simultaneous, multiple point, indeterminate collision. This work strictly adheres to the assumptions of rigid body modeling in conjunction with the notion that the configuration of the system are constant in the short time span of the collision, which enforces a kinematic relationship between the impact points. The post-impact velocities are determined by using the work-energy relationship of a collision and an energetic coefficient of restitution (ECOR) to model energy dissipation. A three and six degree-of-freedom (DOF) model of the system is considered in this work to examine the stick-slip transition and simulate the post-impact behavior. Simulations are conducted for each model using different coefficients of friction (COFs). The results obtained are compared to theoretical and experimental results reported in other works.
Abstract Writing

• Extended abstract
  • *def.* a summary of the contents of a book, article, or formal speech with more detail about the methods used, results obtained, and a short references section.

• Example:
  • Conference: Call for abstracts
Professional Conferences

- I did this research and wrote this paper, now what?

- *def.* is a meeting of professionals in a given subject or profession, dealing with organizational matters, matters concerning the status of the profession, and scientific or technical developments.
Professional Conferences

- Notable organizations with multiple annual conferences
  - IEEE
  - AMA
Closing Comments

• Questions?