**Strategy for writing scientific papers**

1. Determine the scope:
   1. General contributions to long-term goals:
      * What is the scientific goal of the research that motivates this study?
      * Or, what is the technical challenge that is being addressed?
   2. The specific problem that is addressed; establish the direct link
      * To how this piece of the puzzle contributes to the long-term goal.
      * Or, how does solving this technical challenge and the proposed development of the technique help advance or enable our analysis capability?
2. Audience: To whom is this paper addressed.
   1. We choose the Journal based on this and the writing style
      * Who should read the paper and how do we want it to be used?
        + Is it to teach Graduate Students and researchers – i.e. are we writing so that the supervisor passes it on and says “ do this”? Then we need a step-by-step and transparent list of tasks/procedures.
        + Is it to provoke thought or discuss physics deeply? – Writing for experts – less details, more in-depth.
   2. Determine who should review the paper (pick potential reviewers):
      * These should be chosen based on expertise and also their writing strategy as under 2(i)
      * Look at the type of work that is getting more citations. Which pattern do we want to follow?
3. Determine the conclusions.
   * + These are preliminary, but should help focus the discussion and the presentation style.
4. Lay out the figures and data supporting the primary and corollary conclusions.
5. Write an outline:
   1. Order the figures to form a cogent argument.
   2. Write in bullet form the topic sentence for paragraphs.
   3. Relate the topic sentences to the figures:
      * One sentence on what this shows (logical statement leading to conclusion)
      * One sentence on what and how it shows this.
      * May need another sentence on how it leads to next figure/statement.
6. Write:
   1. Abstract (less than 75 words answering: What, Why, How, M main conclusion.
   2. Conclusions: Not only a summary – ties in the SCOPE and the RESULTS – how is what we show important and how does it lead to the next step.
7. Write first draft of introduction:
   1. Why is what we are doing important?
   2. What are application areas?
   3. What did we learn from earlier studies?
   4. What is the thesis or hypothesis of the paper?
   5. How are we going to show this: problem to be addressed and layout of paper.
8. Now write the paper.
9. Revisit Introduction and Abstract
   1. Does it lead to why conclusions are important?
   2. What are we contributing to the science or techniques?
   3. Is the audience addressed correctly?

**Writing Proposals**

1. Lay out end goal
   1. Outcomes
   2. Conclusions
      * Why are they significant and important
      * What are the applications?
2. Determine the novelty
   * + Identify what is transformative.
3. Objectives
   * + How they lead to the end goal.
4. Tasks
   * + How the objectives will be reached.
5. Steps and Milestones:
   * + Important interim outcomes to achieve the objectives
     + Give a timeline and sequence.
6. Link outcomes back to scope and end goal:
   * + Emphasize:
       - Novelty
       - Transformative Nature
       - Pertinence to application.

Follow the **S.M.A.R.T.** guidelines:

**Specific**: The goal /objective is stated in a clear and definite manner. It answers the What, Why, Who, Where and Which questions.

**Measurable**: a goal/objective is measurable if the “How much”, “how many” or “how will I know when the goal is met” questions can be answered.

**Achievable:** can the goal/objective be achieved: What are plan A and B for different challenges?

**Relevant:** Is the goal/objective related to the desired outcomes?

**Timely:** Is the time frame for accomplishing the goal feasible?

Example: “To network with as many people as I can.” is a poor formulation.

Better formulation: “To introduce myself to each person on the floor I work on and learn everyone’s names and job function by June 2, 1022.”

The statement identifies who I will be networking with, the measurement will be the number of people who work on my floor, it will be achievable for my work environment, definitely relevant to my internship and date gives an opportunity to complete my goal.