The typical elements that should be contained in your presentation on a paper (or a series of papers) include:

**(1) Overview:**

(a) Big picture:
What is it that the paper is trying to accomplish?

New observations in nature; Improve existing theoretical/experimental/numerical approaches; Develop new techniques; Test theoretical results with numerical, lab or field tests; Make predictions for real-world problems – deterministic? stochastic (prediction under uncertainty)? Develop (traditional) models to study new phenomena? Develop novel models to study new phenomena? Develop novel models to study old phenomena?

(b) Background:
What have been done (summary of past works)?
What are the needs (why past works are insufficient to provide the full answer)?
How does the current work fill the needs (or partially address the needs)?

**(2) Methodology (if applicable):**

(a) List the main features or the procedure of the methodology. Can you detect any fault with the procedure?

(b) List the main assumptions. Do you see a problem with any assumption?

(c) Discuss:
If based on existing method, what are the improvements (can we really believe these are improvements)?

If new method, what distinguishes it from existing methods? Why is this method better than existing methods? If it's not clear whether it's a better method, what are the novel aspects (sometimes a new method is not necessarily better than existing methods, rather, they are new venues used to study old problems)?

**(3) Real-world Applications (if applicable):**

(a) What are the problem specifications?
Location; Time; Data collection; Who collected the data? Any potential problems with the quality of the data? If so, how did the author(s) treat these problems?

(b) Is the methodology appropriate to address this problem? Any aspects of the problem that contradict the assumptions that were used to develop the method? If so, how did the author(s) justify it?

**(4) Discussions (if applicable):**

List the main results and findings that are discussed.

For each result: are the discussions logical and valid? Do they highlight the new contributions of this work? What are the main contributions? What are the implications for future work (these elements are sometimes hidden in the discussion section rather than in conclusion)?

**(5) Conclusions & Future work:**

List the main conclusions.

List the future work.

Are the conclusions and future work logical? Besides what the author(s) have pointed out, can you identify additional future work that extends and compliments the existing work?

**Further Suggestions:**

(1) Skim the paper(s) 1st time quickly to get an overall idea;

(2) Read the paper(s) 2nd time carefully in detail, keeping notes on the highlights and important points as you read along. Summarize the notes on the 1st page of the paper. (*This is a good habit to keep. Overtime, as you collect more papers relevant for a research project, these summaries are very helpful to give you a quick idea of what each paper is about*.)

(3) Imagine yourself as a reviewer who's assigned to review this paper. Your opinions matter!

(4) When making observations on the various points listed above, be critical but fair. You need not to agree with the authors on everything, but keep in mind that some of the classical papers are also dated. They have provided significant insights/results pertinent to what was known then, but new results may have since come out. However, these award-winning papers are significant because they often had helped launch a new research direction, thus exerting significant influences on future research.

**Final thoughts**: To really understand a paper, you have to understand the motivations for the problem posed, the choices made in finding a solution, the assumptions behind the solution, whether the assumptions are realistic and whether they can be removed without invalidating the approach, future directions for research, what was actually accomplished or implemented, the validity (or lack thereof) of the theoretical justifications or empirical demonstrations, and the potential for extending and scaling the problem up/down.