Clear, appropriate system definition/well-defined system picture, boundaries, & flows

Correct, appropriate use of conservation balances on defined system

Correct, appropriate use of fundamental physical/biological principles (transport phenomena, reaction rates, biology/biochemistry, etc.)

Analysis of model equations to ensure dimensional consistency

Use of appropriate computational tools to obtain values for quantitative model parameters

Demonstrated modeling process, significant, logical model development, iterations

Clear, well-thought out analysis of model/results

Final report

The final report and model are due by the final week of classes and will take the place of a final course exam. Please send reports in both a printed report and a PDF electronic file, along with relevant computational files in electronic form (so I can operate them).  Please make sure the report is presented a professional engineering report, i.e. clearly organized, cleanly formatted, appropriate figures, well-written (check grammar, spelling, organization, references/citations).  The report should be a stand alone, independent report of the final model, including full presentation of the background information, definition of the model system, nomenclature, assumptions, model development, computational results, and analysis of model reasonableness/accuracy and limitations.

The main focus of your report is to present the final model along with analysis of its assumptions/reasonableness. Use appendices for iterations and any other materials that clearly demonstrate/show the modeling process.  Computational programming should be included, which should be professionally presented, i.e. fully documented, explaining parameter nomenclature/units, corresponding explanations in report, etc.

The final report should provide an appendix showing how your model was developed from first principles, i.e. show modeling iterations of your project from simple to more complex, as well as including a computational model. With each iteration, you must note what assumptions are changed and show all steps of each iteration in developing the new model, including any relevant parameters, relationships, and principles employed in that iteration. A brief explanation of these relationships, parameters should be included as needed.

It is expected that your model will use numerical values of your parameters, which may be assumed or obtained from available data, bibliography. Values should be checked for reasonableness, i.e. similarity to known quantities, values.

1. Clearly show each iteration individually, i.e. put on separate sheets of paper with any relevant diagrams, assumptions, parameters, relationships, etc.
2. Do not gather models from other sources and try to assemble them into your model. Your work must show model development starting from first principles/fundamental/basic concepts/principles, i.e. do not write down the Navier-Stokes equations as a relationship used in the 1st iteration of your model.

Final report format

Report is expected to be presented in a professional fashion, i.e. same quality as a report that you would create when employed as professional engineer/employee. The report should be representative of the quality of your work as an engineer and may be shown to others, including potential employers. Use table of contents, sections, figures, references, and appendices, as appropriate. Diagrams may be drawn by hand but should be neat and clearly presented. Part of the report evaluation will be based on the professional quality of the report.

The final report should include these sections:

1. Well-presented background/knowledge base of the topic, including any figures, references, etc. Please be sure to cite any materials you use from other authors. It is expected that the level of knowledge used in your work will be at least commensurate with that of a junior engineering student in ABE.
2. Clear explanation and derivation of the final model, including assumptions, parameter relationships, principles, diagrams, definitions, etc. needed to clearly understand how the model was developed/derived.
3. The report should include a section/appendix that :

Clearly demonstrates your understanding/mastery of the process of model development, i.e. starting with a simple model based fundamental principles/phenomena and model development by improving assumptions, parameter relationships, and model derivations over several iterations, leading to your final model. You may wish to put these in an appendix, as appropriate. Your model should be developed from 1st principles (fundamental principles, assumptions), not simply extending/copying models developed by others. This is the primary evaluation criteria of the final report.

Diagrams, definitions of system/boundaries, parameter nomenclature, and any relevant explanations should be included, as appropriate. For each iteration, there should be a clear listing of assumptions/premises, relationships between parameters, and principles used to derive the model in that iteration. Each iteration should clearly show what assumptions have been changed from the prior iteration and the derivation of the resulting model obtained. To save space, with subsequent iterations you may wish to only show the assumptions that have changed in that iteration and refer to prior diagrams/relationships/principles if these have not changed. Note: It is generally beneficial to number all assumptions, equations, diagrams, etc. for easy reference.

1. Computational program

You should anticipate who the expected audience (not me) will be for your final computational model, i.e. a cook, a salon stylist, a marketing analyst, a factory operator, etc., and design the computational input/output accordingly. Your program should be presented in a user-friendly fashion. It should clearly explain what inputs are needed, how to input them and where/how outputs will be presented. The program should be well-documented, simple to use, and include any relevant instructions on use.

An electronic copy of the computational program should be provided so I can alter parameters and see how the model behaves.

1. Analysis of model/Summary Conclusions

There should be a clear analysis of your final model including reasonability of output, model limitations and benefits. This should consist of a set of numerical inputs which represent reasonable values and evaluation/analysis of the model outputs with regards to its reasonability/validity. You may wish to use parametric comparisons based on varying input values to analyze your model. This should include a computational example of your model and written analysis.