TABLE PT1.1 Specific study objectives for Part One.

1. Recognize the difference between analytical and numerical solutions.
2. Understand how conservation laws are employed to develop mathematical models of physical systems.
3. Define top-down and modular design.
4. Delineate the rules that underlie structured programming.
5. Be capable of composing structured and modular programs in a high-level computer language.
6. Know how to translate structured flowcharts and pseudocode into code in a high-level language.
7. Start to familiarize yourself with any software packages that you will be using in conjunction with this text.
8. Recognize the distinction between truncation and round-off errors.
9. Understand the concepts of significant figures, accuracy, and precision.
10. Recognize the difference between true relative error $_t$, approximate relative error $_a$, and acceptable error $_s$, and understand how $_a$ and $_s$ are used to terminate an iterative computation.
11. Understand how numbers are represented in digital computers and how this representation induces round-off error. In particular, know the difference between single and extended precision.
12. Recognize how computer arithmetic can introduce and amplify round-off errors in calculations. In particular, appreciate the problem of subtractive cancellation.
13. Understand how the Taylor series and its remainder are employed to represent continuous functions.
14. Know the relationship between finite divided differences and derivatives.
15. Be able to analyze how errors are propagated through functional relationships.
16. Be familiar with the concepts of stability and condition.
17. Familiarize yourself with the trade-offs outlined in the Epilogue of Part One.