An Open-Source Lab Manual for Computational Physics Using Java

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Course Goals

• Learn enough Java to write simulations
• Learn a few numerical algorithms
• Better understand Newton’s laws
• Explore complex systems and emergent phenomena
• Learn by doing--not by listening to lectures
• Have fun

Lab Manual Features

• Projects are adapted (i.e., stolen) from Gould & Tobochnik, Giordano
• Gives detailed instructions and code fragments--not complete programs
• Self-contained--no textbook or software manuals needed
• Starts with “Hello, world!” and assumes no programming experience
• Prerequisites: one semester each of physics and calculus
• Glossary, API summary, bibliography, quick reference sheet
• Short enough to read: only 118 pages

What’s Not Covered

• Half of the Java language
• 99% of Java’s 3000 built-in classes
• Sophisticated add-on packages (like OSP)
• How to create applets or double-clickable applications
• Managing large software projects
• In-depth numerical analysis, nonlinear dynamics, phase transformations, etc.