A Short Course in Computational Science and Engineering

C++, Java and Octave Numerical Programming with Free Software Tools

Building on his highly successful textbook on C++, David Yevick provides a concise yet comprehensive one-stop course in three key programming languages, C++, Java and Octave (a freeware alternative to MATLAB®).

Employing only public-domain software to ensure straightforward implementation for all readers, this book presents a unique overview of numerical and programming techniques relevant to scientific programming, including object-oriented programming, elementary and advanced topics in numerical analysis, physical system modeling, scientific graphics, software engineering and performance issues. Relevant features of each programming language are illustrated with short, incisive examples, and the installation and application of the software are described in detail. Compact, transparent code in all three programming languages is applied to the fundamental equations of quantum mechanics, electromagnetics, mechanics and statistical mechanics. Uncommented versions of the code that can be immediately modified and adapted are provided online for the more involved programs.

This compact, practical text is an invaluable introduction for students in all undergraduate- and graduate-level courses in the physical sciences or engineering that require numerical modeling, and is also a key reference for instructors and scientific programmers.

David Yevick is a Professor of Physics at the University of Waterloo. He has been engaged for 30 years in scientific programming in various fields of optical communications and solid state physics at numerous university and industrial establishments, where he performed pioneering work on the numerical modeling of optical communication devices and systems. Professor Yevick is currently a Fellow of the American Physical Society, the Institute of Electrical and Electronics Engineers and the Optical Society of America as well as a registered Professional Engineer (Ontario). He has taught scientific and engineering programming for over 20 years and has authored or co-authored over 170 refereed journal articles.

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אָמַר רַבִּי יוֹסֵי בֶּן קִסְמָא, פַּעַם אַחַת הָיִיתִי מְהַלֵּךְ בַּדֶּרֶךְ וּפָגַע בִּי אָדָם אֶחָד,
וְנָתַן לִי שָׁלוֹם, וְהֶחֱזַרְתִּי לוֹ שָׁלוֹם, אָמַר לִי, רַבִּי מֵאֵיזֶה מָקוֹם אָתָּה,
אָמַרְתִּי לוֹ, מֵעִיר גְּדוֹלָה שֶׁל חֲכָמִים וְשֶׁל סוֹפְרִים אָנִי, אָמַר לִי, רַבִּי
רְצוֹנְךָ שֶׁתָּדוּר עִמָּנוּ בִּמְקוֹמֵנוּ וַאֲנִי אֶתֵּן לְךָ אֶלֶף אֲלָפִים דִּנְרֵי זָהָב וַאֲבָנִים
אָמַרְתִּי לוֹ אִם אַתָּה נוֹתֵן לִי כָּל כֶּסֶף וְזָהָב וַאֲבָנִים ,טוֹבוֹת וּמַרְגָּלִיּוֹת
טוֹבוֹת וּמַרְגָּלִיּוֹת שֶׁבָּעוֹלָם, אֵינִי דָר אֶלָּא בִּמְקוֹם תּוֹרָה

Rabbi Yose ben Kisma said: Once I was walking on the road, when a certain man met me. He greeted me and I returned his greeting. He said to me, 'Rabbi, from what place are you?' I said to him, 'I am from a great city of scholars and sages.' He said to me, 'Rabbi, would you be willing to live with us in our place? I would give you thousands upon thousands of golden dinars, precious stones and pearls.' I replied, 'Even if you were to give me all the silver and gold, precious stones and pearls in the world, I would dwell nowhere but in a place of Torah.' (Ethics of the Fathers 6:9)

Rabbi Jose, Kismas son, berättade: En gång gick jag ut och vandrade, då mötte mig en människa, som hälsade mig, och jag besvarde hans hälsning. Han sporde mig: Rabbi, varifrån är du, och jag svarde honom: Från en stor stad, full av visa män och skriftlärda. Då sade han till mig: Rabbi, om du vill bo hos oss i vår stad, vill jag giva dig tusen gånger tusen guldmynt, ädelstenar och pärlor. Jag svarade honom: Om du så gåve mig all världens silver, guld, ädelstenar och pärlor, skulle jag aldrig vilja bo på ett annat ställe än där Torahn har sin hemvist. (Fädernas Tankespråk 6:9)

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