

# ILLINOIS INSTITUTE OF TECHNOLOGY

CHICAGO, 60616

DEPARTMENT OF PHYSICS

April 29, 1976

Professor Elliot Tanis  
Mathematics Department  
Hope College  
Holland, Michigan 49423

Dear Professor:

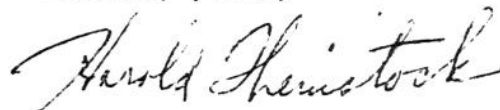
I have had a most difficult time choosing from among approximately 120 well-qualified U. S. and Canadian applicants for our Advanced Study Institute. According to the arrangements agreed to, I am permitted to select only 15 individuals from that group to receive what is admittedly limited financial support. Those fortunate individuals have now been chosen and have agreed to arrange for the additional financing required. Regretfully, I was not able to include you among those receiving support from NATO funds.

There was little to separate the qualifications of so many worthy individuals, and I trust that you will not be disheartened by your fate in this matter. Basically, no one was unqualified.

NATO does allow for a small number of unsupported participants, of which perhaps 5 may come from the U. S. and Canada. Should you be in the happy (but unlikely) position of being able to finance a trip to the Institute, I would welcome the opportunity to include you as an (NATO) unsupported participant. I will accept individuals as such, until I am informed our quota has been filled, i.e., it will be done on a first come - first served basis.

Due to the overwhelming response to this Institute, I am hoping to arrange a North American version of it at a later time. If successful in this endeavor, your participation would be most welcome.

Sincerely yours,



Harold Weinstock

HW:ikm

P.S. You have been chosen as one of a group of alternates who may receive a financial award in the event of a last minute cancellation.

UNIVERSITÉ CATHOLIQUE DE LOUVAIN  
Louvain-la-Neuve

NATO ADVANCED STUDY INSTITUTE ON COMPUTER-BASED SCIENCE INSTRUCTION  
19-30 July 1976

Scientific Organizing Committee :

Director : Prof. A. Jones  
Centre IMAGO  
Université Catholique de Louvain

Co-Director : Prof. H. Weinstock  
Illinois Institute of Technology  
Chicago, U.S.A.

Members :  
Prof. A. Kaufmann  
Université Catholique de Louvain  
Prof. A. Bork  
University of California  
Irvine, U.S.A.

Your Ref.

Our Ref.

Date

May 4, 1976

Professor Elliot Tanis  
Mathematics Department  
Hope College  
Holland, Michigan 49423

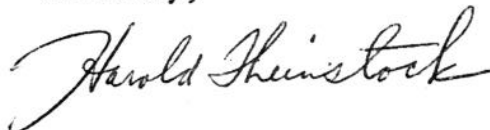
Dear Professor Tanis:

As per our recent phone conversation, this is to inform you that you have been chosen as a participant for the above named NATO Advanced Study Institute, but without the allotment of NATO funds.

The fee of 8,000 BF (equivalent to about \$200) must be paid by May 15 as indicated on the enclosed information sheet. This fee covers the cost of lodging in a single room from July 18 to 30, the Institute banquet, various social functions, coffee breaks, published proceedings and assorted hand-outs. Meals can be purchased at a university cafeteria at a nominal sum.

I commend you for your interest in attending the Institute as an (NATO) unsupported participant, and look forward to meeting you in Louvain-la-Neuve this July.

Sincerely,



Harold Weinstock

HW:ikm

Enclosure

Computer Based Laboratory for  
Mathematical Probability and Statistics

Elliot A. Tanis  
Hope College  
Holland, Michigan 49423

Some concepts in probability and statistics can be illustrated with random experiments which use dice, cards, and urns containing colored beads. However the nature of such experiments limits their applicability and often dictates that sample sizes must be small.

The computer allows us to efficiently simulate many different types of random experiments. In order for a student to write a computer program which will simulate a physical experiment, he is required to understand the experiment and available simulation techniques. It is also possible for a student to simulate theoretical results and in so doing he gains a better understanding and appreciation of the theory.

Laboratory exercises have been written for a year-long course in mathematical probability and statistics. Some of the exercises illustrate the simulation of physical experiments, while others help the student understand theoretical concepts. The students are encouraged to experiment. For example, if certain hypothesis in a theorem are not satisfied, what are the consequences? Some answers can be obtained empirically.

This laboratory meets for two hours each week. It is currently in operation for the fifth year. Originally all programs were run in the batch mode. However, with interactive terminals now available, the graphing routines have been rescaled so that they fit on terminal output. The interactive capability greatly enhances this laboratory.

Elliot A. Tanis

11. A grant from the National Science Foundation permitted me to develop exercises for a year long course in mathematical probability and statistics. My materials have been favorably reviewed by CONDUIT and will be distributed by them. (I am attaching a Xerox copy of a page from their recent issue of PIPELINE.) My laboratory manual accompanies a textbook that I have written with Dr. Robert V. Hogg, Chairman of the University of Iowa Statistics Department. Our textbook is being published by Macmillan Publishing Co. It is currently in production and should be on the market January 1, 1977.

I have presented talks on my materials at three conferences, CCUC/3, CCUC/4, and the First British Conference on Computers in Higher Education.

Under our grant from the National Science Foundation, Dr. Herbert Dershem, a computer scientist and colleague, developed computer based materials for our Introductory Statistics course. I am currently teaching that course.

In addition to my own work, as chairman of Hope's Mathematics Department, I am interested in promoting more uses of the computer in our curriculum. During the past year materials were developed at Hope College by Professor Van Iwaarden for using the computer for numerical techniques in differential equations. In addition Professor Whittle, another member of our Department, has developed materials for using the computer to generate exams for each of 9 modules in Precalculus Mathematics.

I am interested in learning about other applications of the computer in both mathematics and science courses.

For my own personal growth, I am interested in learning more about modeling and simulation. I am particularly interested in learning how we could build on the experiences of students who have taken my statistics laboratory. The potential use of Interactive Computer Graphics is also of great interest to me.

#### Relevant Publications

"Theory of probability and statistics illustrated by the computer", Proceedings of the 1972 Conference on Computers in Undergraduate Curricula, pp. 513-20 (1972).

"A computer laboratory for mathematical probability and statistics", Proceedings of a Fourth Conference on Computers in the Undergraduate Curricula, pp. 416-26 (1973).

"Mathematical Probability and Statistics Computer Laboratory", Int. J. Math. Educ. Sci. Technol., vol. 5, 717-722 (1974).

## HOPE COLLEGE

HOLLAND, MICHIGAN 49423



February 24, 1976

Professor H. Weinstock  
Co-Director  
Scientific Organizing Committee  
NATO Advanced Study Institute on  
Computer-Based Science Instruction  
Physics Department  
Illinois Institute of Technology  
Chicago, Illinois 60616

Dear Professor Weinstock:

I am writing in support of Professor Elliot Tanis' application for a grant to attend the NATO Institute on Computer-Based Science Instruction in July, 1976. I highly recommend that a grant be given for this purpose as attendance at the Institute will significantly enhance Professor Tanis' professional development and should enable Hope College to embark on significant new instructional endeavors in the area of computer-based instruction. With the recent acquisition of a time-sharing computer system, the College is in a particularly strong position to take such steps.

Professor Tanis has been one of the prime movers at the College in bringing the computer into mathematics instruction. In fact, the support which he and Professor Dershem received from NSF to develop the statistics materials is indicative of the involvement these two people have had at the national level. The results of their efforts have been excellent and have led to meaningful computer-based instruction for our students. Tanis, Dershem and Professor John Whittle will soon be developing a computer-based laboratory program for an introductory course in statistics for social science students. There is no question that Tanis is extremely capable of producing usable results when he sets out to incorporate the computer in mathematics curricula. It is for this reason that he is a particularly valuable person for Hope to have attend this Institute. I am confident that he will return to the campus and take the lead in influencing others in the science division to more fully utilize computer-based instruction. The science division has recently submitted a proposal which would allow us to initiate a computer-oriented applied mathematics program for science students. In addition, computer based instruction in chemistry and physics would be expanded and would be initiated in biology. Professor Tanis' experience at the Institute will aid greatly in these activities, most of which we plan to pursue even if the submitted proposal is not funded.

In summary, I strongly support Professor Tanis' request for funding to attend the Advanced Study Institute. Attendance will be of great benefit to him and to the students at Hope College.

Sincerely,

Sheldon Wettack

Dean for the Natural Sciences

SW/kb

## HOPE COLLEGE

HOLLAND, MICHIGAN 49423



February 23, 1976

Prof. H. Weinstock  
Physics Department  
Illinois Institute of Technology  
Chicago, IL 60616

Dear Prof. Weinstock:

This letter is written in support of the application of ELLIOT A. TANIS for financial support for attendance at the NATO Advanced study Institute on COMPUTER-BASED SCIENCE INSTRUCTION.

I feel Dr. Tanis' attendance at the Institute would be beneficial for the Institute, Hope College, and for Teachers of computer-based statistics throughout the United States.

Dr. Tanis has had extensive experience in the development and use of computer-based instructional materials in statistics. These materials have been judged by many colleagues to be innovative and effective. He has presented his work at national and international conferences. His ideas and experience would make a positive contribution the Institute.

He has also provided leadership in the use of the computer in instruction on the Hope College campus. Through attendance at the Institute he could bring back many new ideas to the faculty of the college. The faculty in many disciplines on the campus are now very receptive to the use of the computer, and through Dr. Tanis they could be made aware of many new innovations presented at the Institute.

In addition, since Dr. Tanis' work has been on the frontiers of his field nationally, and his materials are widely distributed and used, any way his work might be enhanced by his attendance at the Institute would be of benefit to the entire user community.

Sincerely,

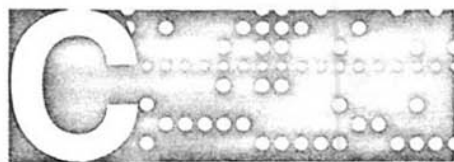
Herbert L. Dershem  
Chairman

HLD/bdm



tions, arrival distributions, cost of servers, and costs of units waiting for service.

Package contents: manual, software on magnetic tape.

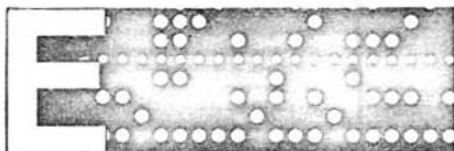


### CHEMISTRY

Baird, H. Wallace. FRSTLW. Wake Forest University, Winston-Salem, North Carolina, revised by Denk, Joseph R., University of North Carolina at Greensboro, North Carolina, 1974, #CHM081.

This tutorial program is designed for student out-of-class exploration of the relationship of an ideal gas to the First Law of Thermodynamics. Students can use any combination of adiabatic, isobaric, isochoric, or isothermal steps to define a path for an ideal gas to reach a prespecified state.

Package contents: manual, software on magnetic tape.



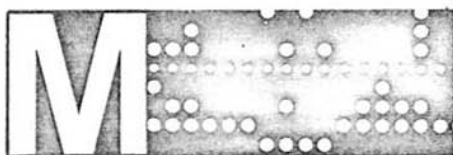
### ECONOMICS

Attiyeh, R. REPORT TO CONDUIT DISCIPLINARY COMMITTEE ON COMPUTER SIMULATION POLICY GAMES IN MACROECONOMICS. Department of Economics, University of California, San Diego, California, 1973, #ECN043.

These six macroeconomic policy games attempt to convey to the

student an understanding of the aggregate behavior of the economy by casting him in the role of economist and policy-maker for a simulated, real-world economy. These models can be used with introductory, intermediate, or advanced students, although the complicated models are more suited to students who have nearly completed a semester introductory macroeconomics course, or are taking an intermediate course.

Package contents: manual, BASIC paper tape, and magnetic tape.



### MATHEMATICS

McLaughlin, D. A COMPUTER-ORIENTED COURSE IN LINEAR ALGEBRA. The University of Iowa, Iowa City, Iowa, 1974, #MTH002.

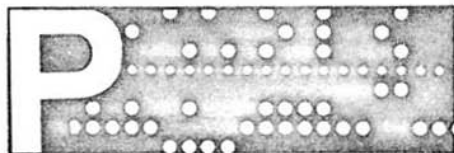
This series of topics in linear algebra utilizes computing to help teach introductory students (1) some of the theory and main results of linear algebra, and (2) the algorithmic nature of relevant topics, such as vector spaces, systems of linear equations, matrices, linear transformations, and linear programming. Students are requested to write simple computer programs to implement the proofs of important theorems utilizing five strategic subroutines provided by the author.

Package contents: manual, software on magnetic tape.

Tanis, Elliot A. LABORATORY MANUAL: MATHEMATICAL PROBABILITY AND STATISTICS. Hope College, Holland, Michigan, 1972, #MTH036.

This manual, which includes topics, problems, and exercises in mathematical probability and statistics, is designed for a weekly two-hour laboratory to be held in conjunction with a year-long course in mathematical statistics at the junior or senior level. Computer use involves student programming in FORTRAN IV, although 62 subroutines or functions are available as "canned" statistical tools for program preparations.

Package contents: manual, software on magnetic tape.



### PHYSICS

Peckham, H. MECHANICS. The Hewlett-Packard Computer Curriculum Series, Hewlett-Packard Company, Cupertino, California, 1972, #PHY057.

Peckham's 28 computer-oriented exercises supplement traditional instruction in mechanics, allowing students to progress through increasingly difficult computer-oriented problems while developing logical, analytical tools, and BASIC computing skills. Simple BASIC programs which serve both as illustrative and calculation tools include:

(1) AVERAGE VELOCITY (11 lines)