Project Title: "Restructuring the Undergraduate Learning Environment"

Project No: G-41-510

Project Director: Dr. J. R. Stevenson

Sponsor: National Science Foundation


Type Agreement: Grant No. SER76-14971

Amount: $9,200 NSF
18,739 GIT (G-41-220)
$27,939 TOTAL

Reports Required:
Annual Letter Technical, Final Report

Sponsor Contact Person (s):

No letter

Defense Priority Rating: N/A

Assigned to: Physics

COPIES TO:

Library, Technical Reports Section
Director, Physical Plant
EES Information Office
Project File (OCA)
Project Code (GTRI)
Other

CA-3 (3/76)
GEORGIA INSTITUTE OF TECHNOLOGY
OFFICE OF CONTRACT ADMINISTRATION
SPONSORED PROJECT TERMINATION

Date: 1/10/79

Project Title: Restructuring the Undergraduate Learning Environment

Project No: G-41-510

Project Director: Dr. J. R. Stevenson

Sponsor: National Science Foundation

Effective Termination Date: 8/31/78 (Grant Expiration)

Clearance of Accounting Charges: n/a - all have cleared

Grant/Contract Closeout Actions Remaining:

- Final Invoice and Closing Documents
- Final Fiscal Report (via Quarterly FCTR)
- Final Report of Inventions
- Govt. Property Inventory & Related Certificate
- Classified Material Certificate
- Other

Assigned to: Physics (School/Laboratory)

COPIES TO:

- Project Director
- Division Chief (EES)
- School/Laboratory Director
- Dean/Director—EES
- Accounting Office
- Procurement Office
- Security Coordinator (OCA)
- Reports Coordinator (OCA)
- Library, Technical Reports Section
- Office of Computing Services
- Director, Physical Plant
- EES Information Office
- Project File (OCA)
- Project Code (GTRI)
- Other
Restructuring the Undergraduate Learning Environment

A new physics course and laboratory entitled "Transport Phenomena" has been developed. The course serves as an integrating experience for students in the undergraduate applied physics program in which many of the mathematical and physical descriptions of the phenomena are shown to be similar. The course is team taught by faculty with research interests and experience in solid state, acoustics, and plasmas. Lectures treat sound energy transport, including a description of shock waves, electrical and thermal conductivity in solids and gases, mass transport in diffusion processes, and fluid flow. The laboratory experience includes such experiments as measurements of physical parameters in plasmas, fuel cells, and acoustical systems. Students give oral presentations on their results.

PART III—TECHNICAL INFORMATION (FOR PROGRAM MANAGEMENT USES)

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<th>ITEM (Check appropriate blocks)</th>
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2. Principal Investigator/Project Director Name (Typed)  James R. Stevenson

3. Principal Investigator/Project Director Signature

4. Date 12/7/78
Attachment

NSF RULE Program
SER 76-14971

Scientific Collaborators:

Dr. E. W. Thomas - Professor of Physics
Dr. E. T. Patronis, Jr. - Professor of Physics

TECHNICAL SUMMARY

Course Content:

I. Transport Phenomena in Gases - E. W. Thomas
   A) Description of a Plasma
   B) Excitation and Ionization Processes
   C) Charge and Mass Transport in a Plasma
   D) Application of the Boltzmann Transport Equation to Plasmas

II. Transport of Acoustical Energy - E. T. Patronis, Jr.
   A) Wave Equation
   B) Adiabatic and Isothermal Approximations
   C) Applications to Nozzles and Shock Waves

III. Transport Phenomena in Solids - James R. Stevenson
   A) Drude Theory of Electrical and Thermal Conductivity
   B) Boltzmann Transport Equation
   C) Diffusion and Charge Transport in Semiconductors
   D) Photoconductivity

IV. Typical Laboratory Experiments
   A) Characterization of the Operational Parameters for a Hydrogen Fuel Cell
   B) Determination of the Velocity of Sound in the Isothermal and Adiabatic Transition Region
   C) Langmuir Probe Experiment on Characterization of a Plasma
   D) Haynes-Shockley Experiment for Measurement of the Mobility of Minority Carriers in Silicon