

**02 INFORMATION ABOUT PRINCIPAL INVESTIGATORS/PROJECT DIRECTORS(PI/PD) and
co-PRINCIPAL INVESTIGATORS/co-PROJECT DIRECTORS**

Submit only ONE copy of this form for each PI/PD and co-PI/PD identified on the proposal. The form(s) should be attached to the original proposal as specified in GPG Section II.B. Submission of this information is voluntary and is not a precondition of award. This information will not be disclosed to external peer reviewers. **DO NOT INCLUDE THIS FORM WITH ANY OF THE OTHER COPIES OF YOUR PROPOSAL AS THIS MAY COMPROMISE THE CONFIDENTIALITY OF THE INFORMATION.**

PI/PD Name: Herbert L Dershem

Gender: ☒ Male ☐ Female

Ethnicity: (Choose one response) ☐ Hispanic or Latino ☐ Not Hispanic or Latino

Race:
(Select one or more)

☐ American Indian or Alaska Native
☐ Asian
☐ Black or African American
☐ Native Hawaiian or Other Pacific Islander
☒ White

Disability Status:
(Select one or more)

☐ Hearing Impairment
☐ Visual Impairment
☐ Mobility/Orthopedic Impairment
☐ Other
☒ None

Citizenship: (Choose one) ☒ U.S. Citizen ☐ Permanent Resident ☐ Other non-U.S. Citizen

Check here if you do not wish to provide any or all of the above information (excluding PI/PD name): ☒

REQUIRED: Check here if you are currently serving (or have previously served) as a PI, co-PI or PD on any federally funded project ☒

Ethnicity Definition:

Hispanic or Latino. A person of Mexican, Puerto Rican, Cuban, South or Central American, or other Spanish culture or origin, regardless of race.

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WHY THIS INFORMATION IS BEING REQUESTED:

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Collection of this information is authorized by the NSF Act of 1950, as amended, 42 U.S.C. 1861, et seq. Demographic data allows NSF to gauge whether our programs and other opportunities in science and technology are fairly reaching and benefiting everyone regardless of demographic category; to ensure that those in under-represented groups have the same knowledge of and access to programs and other research and educational opportunities; and to assess involvement of international investigators in work supported by NSF. The information may be disclosed to government contractors, experts, volunteers and researchers to complete assigned work; and to other government agencies in order to coordinate and assess programs. The information may be added to the Reviewer file and used to select potential candidates to serve as peer reviewers or advisory committee members. See Systems of Records, NSF-50, "Principal Investigator/Proposal File and Associated Records", 63 Federal Register 267 (January 5, 1998), and NSF-51, "Reviewer/Proposal File and Associated Records", 63 Federal Register 268 (January 5, 1998).

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PI/PD Name: Tony Donk

Gender: ☐ Male ☐ Female

Ethnicity: (Choose one response) ☐ Hispanic or Latino ☐ Not Hispanic or Latino

Race:
(Select one or more)

☐ American Indian or Alaska Native
☐ Asian
☐ Black or African American
☐ Native Hawaiian or Other Pacific Islander
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Disability Status:
(Select one or more)

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PI/PD Name: John J Krupczak

Gender: ☒ Male ☐ Female

Ethnicity: (Choose one response) ☐ Hispanic or Latino ☒ Not Hispanic or Latino

Race:
(Select one or more)

☐ American Indian or Alaska Native
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List of Suggested Reviewers or Reviewers Not To Include (optional)

SUGGESTED REVIEWERS:

Not Listed

REVIEWERS NOT TO INCLUDE:

Not Listed

COVER SHEET FOR PROPOSAL TO THE NATIONAL SCIENCE FOUNDATION

PROGRAM ANNOUNCEMENT/SOLICITATION NO./CLOSING DATE (if not in response to a program announcement/solicitation enter NSF 04-23)					FOR NSF USE ONLY	
NSF 05-528		03/31/05			NSF PROPOSAL NUMBER	
FOR CONSIDERATION BY NSF ORGANIZATION UNIT(S) (Indicate the most specific unit known, i.e. program, division, etc.)					0531978	
DUE - Robert Noyce Scholarship Program						
DATE RECEIVED	NUMBER OF COPIES	DIVISION ASSIGNED	FUND CODE	DUNS# (Data Universal Numbering System)	FILE LOCATION	
				050947084		
EMPLOYER IDENTIFICATION NUMBER (EIN) OR TAXPAYER IDENTIFICATION NUMBER (TIN)		SHOW PREVIOUS AWARD NO. IF THIS IS <input type="checkbox"/> A RENEWAL <input type="checkbox"/> AN ACCOMPLISHMENT-BASED RENEWAL		IS THIS PROPOSAL BEING SUBMITTED TO ANOTHER FEDERAL AGENCY? YES <input type="checkbox"/> NO <input checked="" type="checkbox"/> IF YES, LIST ACRONYM(S)		
381381271						
NAME OF ORGANIZATION TO WHICH AWARD SHOULD BE MADE			ADDRESS OF Awardee ORGANIZATION, INCLUDING 9 DIGIT ZIP CODE			
Hope College			Hope College			
AWARDEE ORGANIZATION CODE (IF KNOWN)			35 E. 12th Street			
0022731000			Holland, MI. 494239000			
NAME OF PERFORMING ORGANIZATION, IF DIFFERENT FROM ABOVE			ADDRESS OF PERFORMING ORGANIZATION, IF DIFFERENT, INCLUDING 9 DIGIT ZIP CODE			
PERFORMING ORGANIZATION CODE (IF KNOWN)						
IS Awardee ORGANIZATION (Check All That Apply) (See GPG II.C For Definitions)						
<input type="checkbox"/> SMALL BUSINESS <input type="checkbox"/> MINORITY BUSINESS <input type="checkbox"/> IF THIS IS A PRELIMINARY PROPOSAL THEN CHECK HERE <input type="checkbox"/> FOR-PROFIT ORGANIZATION <input type="checkbox"/> WOMAN-OWNED BUSINESS						
TITLE OF PROPOSED PROJECT Hope College Robert Noyce Scholarship Program						
REQUESTED AMOUNT		PROPOSED DURATION (1-60 MONTHS)		REQUESTED STARTING DATE		SHOW RELATED PRELIMINARY PROPOSAL NO. IF APPLICABLE
\$ 346,000		48 months		01/01/06		
CHECK APPROPRIATE BOX(ES) IF THIS PROPOSAL INCLUDES ANY OF THE ITEMS LISTED BELOW						
<input type="checkbox"/> BEGINNING INVESTIGATOR (GPG I.A) <input type="checkbox"/> HUMAN SUBJECTS (GPG II.D.6) <input type="checkbox"/> DISCLOSURE OF LOBBYING ACTIVITIES (GPG II.C) Exemption Subsection _____ or IRB App. Date _____ <input type="checkbox"/> PROPRIETARY & PRIVILEGED INFORMATION (GPG I.B, II.C.1.d) <input type="checkbox"/> INTERNATIONAL COOPERATIVE ACTIVITIES: COUNTRY/COUNTRIES INVOLVED (GPG II.C.2.j) <input type="checkbox"/> HISTORIC PLACES (GPG II.C.2.j) <input type="checkbox"/> SMALL GRANT FOR EXPLOR. RESEARCH (SGER) (GPG II.D.1) <input type="checkbox"/> VERTEBRATE ANIMALS (GPG II.D.5) IACUC App. Date _____ <input type="checkbox"/> HIGH RESOLUTION GRAPHICS/OTHER GRAPHICS WHERE EXACT COLOR REPRESENTATION IS REQUIRED FOR PROPER INTERPRETATION (GPG I.E.1)						
PI/PD DEPARTMENT			PI/PD POSTAL ADDRESS			
Department of Computer Science			27 Graves Place			
PI/PD FAX NUMBER			Holland, MI 494229000			
616-395-7123			United States			
NAMES (TYPED)	High Degree	Yr of Degree	Telephone Number	Electronic Mail Address		
PI/PD NAME						
Herbert L Dershem	PhD	1969	616-395-7508	dershem@cs.hope.edu.		
CO-PI/PD						
Tony Donk	DPhil	1996	616-395-7190	donk@hope.edu		
CO-PI/PD						
John J Krupezak	Ph.D.	1994	616-395-7152	krupezak@hope.edu		
CO-PI/PD						
CO-PI/PD						

CERTIFICATION PAGE

Certification for Authorized Organizational Representative or Individual Applicant:

By signing and submitting this proposal, the individual applicant or the authorized official of the applicant institution is: (1) certifying that statements made herein are true and complete to the best of his/her knowledge; and (2) agreeing to accept the obligation to comply with NSF award terms and conditions if an award is made as a result of this application. Further, the applicant is hereby providing certifications regarding debarment and suspension, drug-free workplace, and lobbying activities (see below), as set forth in Grant Proposal Guide (GPG), NSF 04-23. Willful provision of false information in this application and its supporting documents or in reports required under an ensuing award is a criminal offense (U. S. Code, Title 18, Section 1001).

In addition, if the applicant institution employs more than fifty persons, the authorized official of the applicant institution is certifying that the institution has implemented a written and enforced conflict of interest policy that is consistent with the provisions of Grant Policy Manual Section 510; that to the best of his/her knowledge, all financial disclosures required by that conflict of interest policy have been made; and that all identified conflicts of interest will have been satisfactorily managed, reduced or eliminated prior to the institution's expenditure of any funds under the award, in accordance with the institution's conflict of interest policy. Conflicts which cannot be satisfactorily managed, reduced or eliminated must be disclosed to NSF.

Drug Free Work Place Certification

By electronically signing the NSF Proposal Cover Sheet, the Authorized Organizational Representative or Individual Applicant is providing the Drug Free Work Place Certification contained in Appendix C of the Grant Proposal Guide.

Debarment and Suspension Certification

(If answer "yes", please provide explanation.)

Is the organization or its principals presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from covered transactions by any Federal department or agency?

Yes ☐

No ☒

By electronically signing the NSF Proposal Cover Sheet, the Authorized Organizational Representative or Individual Applicant is providing the Debarment and Suspension Certification contained in Appendix D of the Grant Proposal Guide.

Certification Regarding Lobbying

This certification is required for an award of a Federal contract, grant, or cooperative agreement exceeding \$100,000 and for an award of a Federal loan or a commitment providing for the United States to insure or guarantee a loan exceeding \$150,000.

Certification for Contracts, Grants, Loans and Cooperative Agreements

The undersigned certifies, to the best of his or her knowledge and belief, that:

(1) No federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

(2) If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure of Lobbying Activities," in accordance with its instructions.

(3) The undersigned shall require that the language of this certification be included in the award documents for all subawards at all tiers including subcontracts, subgrants, and contracts under grants, loans, and cooperative agreements and that all subrecipients shall certify and disclose accordingly.

This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by section 1352, Title 31, U.S. Code. Any person who fails to file the required certification shall be subject to a civil penalty of not less than \$10,000 and not more than \$100,000 for each such failure.

AUTHORIZED ORGANIZATIONAL REPRESENTATIVE		SIGNATURE		DATE	
NAME Tracey Arndt		Electronic Signature		Mar 31 2005 2:05PM	
TELEPHONE NUMBER 616-395-7190	ELECTRONIC MAIL ADDRESS arndt@hope.edu			FAX NUMBER 616-395-7923	
*SUBMISSION OF SOCIAL SECURITY NUMBERS IS VOLUNTARY AND WILL NOT AFFECT THE ORGANIZATION'S ELIGIBILITY FOR AN AWARD. HOWEVER, THEY ARE AN INTEGRAL PART OF THE INFORMATION SYSTEM AND ASSIST IN PROCESSING THE PROPOSAL. SSN SOLICITED UNDER NSF ACT OF 1950, AS AMENDED.					

NATIONAL SCIENCE FOUNDATION
Division of Undergraduate Education

NSF FORM 1295: PROJECT DATA FORM

The instructions and codes to be used in completing this form are provided in Appendix II.

1. **Program-track** to which the Proposal is submitted: Robert Noyce Scholarship Program
2. Name of **Principal Investigator/Project Director** (as shown on the Cover Sheet):
Dershem, Herbert
3. Name of submitting **Institution** (as shown on Cover Sheet):
Hope College
4. **Other Institutions** involved in the project's operation:

Project Data:

- A. Major Discipline Code: 99
- B. Academic Focus Level of Project: UP
- C. Highest Degree Code: B
- D. Category Code: _____
- E. Business/Industry Participation Code: NA
- F. Audience Code: T _____
- G. Institution Code: PRIV
- H. Strategic Area Code: _____
- I. Project Features: _____

Estimated number in each of the following categories to be directly affected by the activities of the project during its operation:

- J. Undergraduate Students: 15
- K. Pre-college Students: 0
- L. College Faculty: 0
- M. Pre-college Teachers: 0
- N. Graduate Students: 0

Project Summary

This project will provide scholarships for academically talented students in the fields of science, technology, mathematics and engineering to support their preparation to become K-12 teachers of science and mathematics. The scholarships will support the final two years of study at Hope College for five students in each of three years. Recipients will be selected during their sophomore years.

The objectives of this project are (1) to increase the number of science, technology, engineering, and mathematics majors completing a K-12 teaching degree program at Hope College, and (2) to increase the diversity of science, technology, engineering, and mathematics majors completing a K-12 teaching degree program at Hope College.

Recruiting activities for recipients of these scholarships will occur in courses taken during the first two years by science majors and in courses taken by students in the teacher education program. Selection of recipients will be made by a selection committee on the basis of academic achievement and motivation for a teaching career in science or mathematics.

All recipients of a Noyce scholarship will have the opportunity to either participate in a Hope College summer research program funded by the Howard Hughes Medical Institute or serve as assistants at the Hope College Summer Science camp.

Intellectual Merit

The proposed Robert Noyce Scholarship program at Hope College will combine the opportunities available through a strong Natural Sciences and Mathematics Division, a highly rated Education program, and an institutional history of undergraduate research to help encourage science, engineering, and mathematics majors to become K-12 mathematics and science teachers. By uniting these three areas, the proposed program offers exciting incentives to prospective teachers and helps to assure that these teachers possess excellent content knowledge. Under this program, each year five Noyce Scholarship recipients will either participate in research during the summer with Hope Natural Science and Mathematics Faculty or assist in the highly successful Summer Science Camp, in addition to usual coursework and training. These experiences add an extra dimension to the education of Noyce Scholars that is expected to broaden and invigorate their view of their disciplinary major, and improve their effectiveness as K-12 teachers.

Broader Impacts

The Robert Noyce Scholarship program at Hope College will encourage in 15 science, engineering, or mathematics majors to become K-12 teachers. Adding this number of new teachers to the national applicant pool will help reduce the instances of out-of-field teaching in science and mathematics. By strengthening the training of prospective teachers in their science or mathematics content area, the Robert Noyce Scholarship program at Hope will help to reduce the number of teachers who leave the profession during the first few years of teaching.

TABLE OF CONTENTS

For font size and page formatting specifications, see GPG section II.C.

	Total No. of Pages	Page No.* (Optional)*
Cover Sheet for Proposal to the National Science Foundation		
Project Summary (not to exceed 1 page)	1	_____
Table of Contents	1	_____
Project Description (Including Results from Prior NSF Support) (not to exceed 15 pages) (Exceed only if allowed by a specific program announcement/solicitation or if approved in advance by the appropriate NSF Assistant Director or designee)	12	_____
References Cited	_____	_____
Biographical Sketches (Not to exceed 2 pages each)	6	_____
Budget (Plus up to 3 pages of budget justification)	6	_____
Current and Pending Support	3	_____
Facilities, Equipment and Other Resources	0	_____
Special Information/Supplementary Documentation	0	_____
Appendix (List below.) (Include only if allowed by a specific program announcement/ solicitation or if approved in advance by the appropriate NSF Assistant Director or designee)	_____	_____
Appendix Items:		

*Proposers may select any numbering mechanism for the proposal. The entire proposal however, must be paginated. Complete both columns only if the proposal is numbered consecutively.

Project Description

1. Results from Prior NSF Support

Hope College has received no prior NSF support from the Robert Noyce Scholarship program. Hope College science departments participating in this project have received considerable NSF support in the past for projects involving faculty research, undergraduate research, scientific equipment, and curriculum development. The Table below summarizes the total of grants received by these departments in past five years.

Department	Number of NSF grants received in the past 5 years	Dollar amount of NSF funding
Biology	4	\$648,265
Chemistry	6	\$694,423
Geological/Environmental Science	1	\$232,513
Mathematics	6	\$799,750
Physics & Engineering	10	\$1,019,948

2. Project Objectives

The objectives of the proposed project are:

1. To increase the number of science, technology, engineering, and mathematics majors completing a K-12 teaching degree program at Hope College.
2. To increase the diversity of science, technology, engineering, and mathematics majors completing a K-12 teaching degree program at Hope College.

3. Program Description

In each of three years, this program will select five sophomore Hope College science students to receive a scholarship of \$10,000 per year for their final two years of study in the pursuit of a K-12 certified teaching degree in one or more of the science disciplines. This will produce a total of 15 new teachers over the duration of the program. The table below lists the number of students receiving certifiable majors and minors in science during the past three years.

2003-2004	Subject	Majors	Minors
Elementary	Elementary Science Group	7	2
Secondary	Chemistry	2	5
	Biology	8	1
	Physics	1	1
	Geology	2	2
	Composite	0	2
2002-2003	Subject	Majors	Minors
Elementary	Elementary Science Group	7	1
Secondary	Chemistry	0	0
	Biology	2	2
	Physics	0	0
	Geology	1	0
	Composite	0	2

2001-2002	Subject	Majors	Minors
Elementary	Elementary Science Group	5	0
Secondary	Chemistry	1	1
	Biology	4	0
	Physics	1	0
	Geology	1	0
	Composite	0	3
Totals		42	40

4. Recruitment and Selection

a. Recruitment

The recruitment of participants in this program will begin during the student's first year of study at Hope College. The PI will coordinate the distribution of printed materials about the program and an in-class presentation in all of the First-Year seminar classes (including those for Phelps Scholars) and in introductory courses in each science discipline. See Sections 8c and 8e of this proposal for a description of First-Year Seminar and Phelps Scholars. The purpose of these presentations will be to encourage students to consider a career in K-12 teaching and to make the students aware of the availability of the Noyce Scholarships.

A web page describing the program will be created. Links to this web page will be placed on the web pages of all science departments, the Hope College Department of Education, financial aid, and admissions. A form on the web page will allow a visitor to request further information about the program. The format of the web pages will follow the format used in Hope College's six successful summer research programs funded by the NSF REU program (see Section 8d) and our NSF CSEMS program (see Section 8g).

During February of each year, all students enrolled in courses that are appropriate to majors in the participating science disciplines will be asked to consider applying for a Noyce Scholarship. This will include those students who are already enrolled in the teacher education program and those who are not. The PI will inform each of the applicants of the requirements of the Noyce Scholarship program. The applications will be collected by the PI, who will determine a list of candidates for the program. This will follow the similar procedures used at Hope College to recruit applicants for the Clare Booth Luce Scholarship and the NSF CSEMS Scholarships (see Sections 8f and 8g of this proposal).

Throughout the recruitment and selection process, special encouragement and consideration will be given to students from groups that are underrepresented in science education, including persons of color, persons with disabilities, and women.

b. Selection

After the candidate list is finalized, the Noyce selection committee will conduct a personal interview with each candidate. The Noyce selection committee will consist of a faculty member of the Hope College Department of Education as designated by the chair of that department, a faculty member from the Science Division as designated by the Dean of the Sciences, and the PI of this project. The PI will serve as chair of this committee. The committee will determine the five recipients of the Noyce Scholarships each year based on the following criteria:

- Motivation and potential for a successful teaching career in the sciences or mathematics.
- Academic merit as measured by academic performance during the student's first three semesters of college work.
- Financial need of the applicants.

5. Administrative Plan

a. Management and Administrative Structure

An Advisory Committee will oversee the implementation of this program. That committee will consist of the PI, the two co-PIs, the chairperson of the Hope College Department of Education, and the Dean of the Natural Sciences. The Advisory Committee will be chaired by the PI, who will be responsible for the day-to-day management of the program. In addition, the PI will direct the evaluation plan and fulfill the reporting function to NSF. The tracking of graduates of the program will be performed by the Hope College Department of Education.

The Hope College Financial Aid Office will be responsible for the distribution of the scholarships and the coordination of the scholarships with other financial aid being received by the students. In no case will the Noyce Scholarship replace other scholarships being received by the students.

b. Infrastructure

The Department of Education at Hope College actively works to maintain relationships with all graduates of the teacher education program as they commit to teaching and on-going professional development, both before and after graduation from the institution. This infrastructure will be available to recipients of the scholarship program.

Throughout their undergraduate experience, prospective teachers at Hope College use a variety of on-line technologies to interact with each other and faculty. Hope College uses DISCUS for discussion boards related to courses, as well as Moodle for course management and discussions. These technologies will be available to recipients for discussions related to their course work and research activities. As new teachers, recipients will use the website developed by the Hope College Department of Education for on-going interactions with the department and faculty.

Given the relatively small size of Hope College, as well as its mission, close professional relationships between faculty and students are encouraged. These relationships are frequently maintained as students enter the teaching field. As new teachers, it is common practice for individuals to contact faculty for professional advice and on-going mentoring

– online, via the telephone, and/or in person. In addition, faculty members regularly provide professional development training in school districts in which graduates work – sometimes at the initiation of former students. In addition to these informal contacts, the Hope College Department of Education has developed a systematic survey that is administered to graduates.

c. Functioning Partnerships

The Department of Education at Hope College has a long standing history of collaboration with school partners in our region, many of which school districts meet the criteria in the Noyce guidelines as a high need local educational agency. Education faculty provide service to area schools through professional development activities, presentations to K-12 students, membership on school and district committees, and membership on a local school board.

Recent evidence of such partnerships includes:

- The Field Placement Building Representative Program formalizes the process for collaboration between the Hope College Department of Education and K-12 schools with regard to field placements, which are attached to nearly all departmental courses. In this program, one teacher representative is chosen from each school to act as the “eyes and ears” of the Hope College Department of Education in that building. Meeting with Education faculty once or twice a semester, the teacher representatives provide feedback from their schools on field placement experiences and patterns of concern and interest.
- Project TEACH (see Section 8h) provides opportunities for minority prospective teacher candidates to be identified in area high schools. They are mentored during their last two years of high school through admittance into the college to completion of the program in teacher education.
- A recent project in an area middle school paired Hope College Department of Education faculty with sixth grade teachers and students as they discovered the value of hand-held computers in education.
- The Hope College Department of Education, through a project funded by the Templeton Foundation, involves teacher education candidates with minority students for intensive field placement and student teaching experiences in area schools.
- Education faculty are involved in research projects involving teachers and students in area schools.

d. Compliance Monitoring

The PI will be responsible for monitoring and enforcing compliance with the required teaching commitment. Each participant will sign a contractual agreement at the beginning of each year of scholarship support. That agreement will legally bind the recipient to the required teaching commitment. If that commitment is not fulfilled, the PI will work with the Hope College Business Services department of the college to implement the required procedures. The Hope College Office of Career Planning and Placement Services monitors the teaching employment of all graduates and will provide the PI with the necessary information.

6. Institutional Commitment

a. New Science Center

In October, 2004, Hope College dedicated its new Science Center. The science center project included both the construction of a new, 85,900 square foot building and the renovation of the existing, 72,800 square foot Peale Science Center. In doubling the size of the existing Peale Science Center and reflecting changes in both technology and teaching methodology since Peale opened in 1973, the new building and renovation of Peale help assure that the college's facilities are equal to the outstanding teaching and scholarship that take place within them.

The building houses the departments of biology, chemistry, the geological and environmental sciences, nursing and psychology. It was designed to complement the college's on-going emphasis on collaborative student-faculty research as a teaching model, and organized to facilitate connections between departments.

The Noyce scholars will have all of their science classes and laboratories in this building.

b. Howard Hughes Medical Institute grant

In 2004, Hope College received a \$1.5 million grant from the Howard Hughes Medical Institute for support of its undergraduate science program. A part of this project is the Hughes Science Education Scholars to promote development of pre-service K-12 teachers. See Section 8a for a brief description of other initiative of that project.

Annually, in the summers of 2005-2008, stipends will support 5 students intending a career in primary or secondary school science teaching to work with faculty on curriculum development project, including the development of modules. They will be mentored by the faculty such that they will "scale" their efforts in a manner targeted to the grade levels in which they will do their student teaching. Thus, they will form a team to address needs of K-12 student learning in science and will partner with the in-service teacher for implementation of the teaching module or methods into the class. The mentoring faculty will be expected to visit the student while she is teaching and participate with the student in understanding the strengths and/or limitations of the experience and make adjustments when appropriate. The Education Scholars will participate in the faculty summer workshops on integrating research and teaching, the student research enrichment program, and will make all on- and off-campus presentations. Students will be identified through a nomination process by the Education faculty of Hope College and complete the summer application process as appropriate for all research students at Hope College. Stipends for Education Scholars will be the same as for all research students at Hope. Faculty mentors are selected for their interest and involvement in curriculum development efforts.

In each of the summers 2006-2008, at least two of the Hughes Science Education Scholars will be Noyce scholarship recipients. This will provide these students with funding to participate in the program described above.

c. Hope Summer Science Camps

Each summer, Hope College hosts a Summer Science Camp. See Section 8b for a description.

Each summer during the Noyce Scholarship project, at least three Noyce Scholarship recipients will work as undergraduate assistants with this camp. The camp employs six undergraduate students who serve as assistants each summer. During the first 4 weeks of the summer, these student assistants pull together experiments from many different sources/resources for each camp theme. They then compile this information into a manual with daily lessons and hands on activities. The next week, they assemble the necessary materials by locating them at Hope College or purchasing them through local stores or online. Finally, the student assistants test the experiments and make necessary adjustments. Once they have everything ready, they construct a parent helper manual. When the camps begins they are involved with teaching and modifying the material as necessary. At the end of each session they conduct evaluations for the camps from both campers and parents.

d. Hope College Summer Research Housing Waivers

Each summer, Hope College waives one-half of the cost of on-campus housing for students doing summer research (Section 8d). This support will be provided for all Noyce scholars who participate in the Hughes Science Education Scholar program.

7. Evaluation

The Carl Frost Research Center, located on the Hope College Campus, will conduct the evaluation of this project. Established in 1990, the *Carl Frost Center* is an independent research institute. The center provides research services for a wide variety of academic, community, and commercial clients. Specific research services include: needs assessments, survey research, program evaluation, demographic profiles, and findings analysis. Current efforts include work for the Ottawa County Independent School District conducting surveys of district teachers after 1 and 5 years of service. Additional information about the *Frost Center* can be found at: www.frostcenter.org or www.hope.edu/frostcenter.

Dr. Eileen Robertson-Rehberg, director of the *Frost Center*, is familiar with existing teacher effectiveness assessment instruments and the protocols necessary for modifying and administering such tests. She holds a Ph.D. in Policy Analysis and Management from Cornell University, and has conducted research on quantitative and qualitative methods in program evaluation and planning. She will oversee the program evaluation.

As an independent research institute the Frost Center is well-suited to conduct the type of evaluation needed for the Noyce Program. Besides the expertise in assessment cited above, the Frost Center is an established stand-alone research center. The Frost Center is in a position to carry out a multi-year evaluation of the Noyce scholarship recipients.

The Evaluation Plan

The evaluation plan will address the extent to which the program has attracted undergraduate mathematics and science students that are committed to and well prepared for a teaching career in grades. To address program recruitment, implementation and outcomes, the evaluation will employ a mixed methods design of both quantitative and qualitative methods.

Data will be gathered by the Frost Research Center at several points in time from a variety of sources. Data will be gathered upon student entry into the program, during each semester at the institution, at the end of each semester, and each semester of the student's assignment to a local educational agency. Methodologies specific to each point in time are described below:

Recruitment:

- Data will be gathered to identify how the program has attracted students into teacher preparation
- Intake interviews will be conducted to discover how the scholarship has helped students to address financial need
- Demographic data will be collected as students enter the program

Program implementation:

- Documentation of student performance will be provided by the college for an assessment of student progress at the end of each semester.
- Interviews of students at mid semester will provide qualitative data for assessment of student progress and potential barriers to success

Program outcomes:

- The teaching assignment will be evaluated each year with a survey of program recipient's self reported instructional strategies, instructional materials and assessment of student achievement. The survey will provide the program recipient an opportunity to self report on "lessons learned" in the field of STEM instruction.
- Classroom observation will rate program recipients on site for factors such as knowledge, preparation, organization, clarity of presentation and student participation.

Protocols, Roles, and Responsibilities

The plan incorporates the evaluation results as process (formative evaluation) and as a completed program (summative evaluation). The formative evaluation will provide program supporters in STEM and Education disciplines with valuable information to enhance the student's learning experience. Student information will be reviewed by program supporters each semester. A summative evaluation will include all of the gathered program data and analysis to funders. Summative evaluations will be conducted on an annual basis and will be cumulative.

Survey development, data collection and data management will be the responsibility of the Frost Research Center except in cases where information is available through school

records. Students will be fully advised of data collection arrangements and they will be contractually bound to those agreements.

8. Activities on Which the Current Project Builds

a. Howard Hughes Medical Institute Project

In 2004, Hope College received a \$1.5 million grant from the Howard Hughes Medical Institute to support a number of activities. These activities include

- an early entry research program for women and minority students
- development of an interdisciplinary curriculum that addresses complex systems in biology built through modules for existing courses and new minors in Neuroscience and Computation Modeling
- developing faculty as scholars in interdisciplinary research, teaching, and student learning, and preparing future faculty through a postdoctoral initiative
- training of pre-service K-12 science educators.

b. Hope College Summer Science Camp

Hope College provides a summer opportunity for K-8 students to explore chemistry, biology, physics, geology, forensics, rocketry, flight and health sciences. The program features “hands-on” interactive investigations designed to teach concepts in a fun yet challenging way. A workbook (for use in the camp) and a parent manual are provided for each session. Twenty one-week sessions are offered over a six-week period each summer. In the summer of 2004, some sample titles of the sessions were

- Lego Robotics
- Math Pentathlon
- Crime Scene Investigations
- Prehistoric Planet
- Toxic Planet
- Space and Rocketry
- ER
- Demented Dissection

c. First-Year Seminars

Hope College offers First-Year Seminars, which are required of all Hope College students during the fall semester of their initial year. First-Year Seminars are small, discussion-driven classes taught by professors who serve as academic advisors for students in their seminar. The First-Year Seminar helps introduce new college students to the life of the mind and to the kind of college-level learning expected in other classes at Hope College. Each section of the First-Year Seminar focuses on a different topic that is chosen by the professor.

d. Undergraduate Research

The science division at Hope College has an active undergraduate research program. Each summer over 100 students participate in undergraduate research project in science division. Six departments have continuing NSF Research Experiences for Undergraduates (REU) projects. Those departments are Biology, Chemistry, Computer Science,

Geological & Environmental Sciences, Mathematics, and Physics & Engineering. Through these undergraduate summer research projects, Hope College science departments have developed a complete system for recruiting and selecting participants including distribution of information in science classes and information web pages. These resources will be employed for the effective recruitment of Noyce Scholars. In addition, those Noyce scholars who participate in the Howard Hughes Medical Institute summer program will participate in many of the activities provided through summer research.

e. Phelps Scholars

Every August since 1999, approximately fifty new students, strangers to each other, have come to Hope to begin their first year of college as Phelps Scholars. The Phelps Scholars Program is a multicultural program available to Hope College freshmen from all racial/ethnic backgrounds, designed to facilitate an enjoyable transition to Hope College and provide the foundation for productive years as members of our student body. The activities of these Phelps Scholars include:

- First-Year Seminar in the fall term
- Encounter with Cultures in the spring
- Bi-monthly meetings on many different topics, such as "Cross-Cultural Communication" and "The Role of Race in American Sports"
- Field trips to numerous destinations, including Detroit's Holocaust Memorial, Chicago's World Music Festival, and the Underground Railroad re-enactment at Conner Prairie near Indianapolis
- Sponsoring a Christmas party for elementary students in Hope's CASA program
- Informal gatherings-dinners, parties, and get-togethers just for fun

f. Clare Booth Luce Scholarships

In 2004 and 2005, Hope College has awarded two Clare Booth Luce scholarships each year to women majoring in computer science, physics, or engineering. Female students pursuing one of the eligible majors apply during the second semester of their sophomore year. The scholarships support them in conducting research at Hope during the summer after they are chosen, during their junior year and during the summer following their junior year. The students also are expected to continue to engage in research as seniors, and will have a chance to continue in research during the summer after graduation. They also receive full scholarships for tuition, fees, room and board for their junior and senior years at the college.

g. NSF CSEMS Scholarships

In 2004-2006, Hope College will award scholarships to 36 students to study computer science, engineering or mathematics. These scholarships, renewable for up to four years, are funded by a grant of \$400,000 from the National Science Foundation. Each of two years, 12 incoming first-year students and 6 students already enrolled in science courses at Hope College will be awarded one of these scholarships. In accordance with the provisions of this program, recipients must be enrolled in a program in one of the three disciplines and must have demonstrated financial need. In addition, members of groups that are underrepresented in these three fields are given special consideration.

h. Project Teach

In 1994, Hope College received funding to begin an innovative program that would identify and support students of color in the local school districts who expressed a desire to become teachers. Through a thorough application and interview process, four high school students are chosen each year to become members of "Project Teach." These four students are provided with a Hope College Department of Education student mentor with whom they have weekly contact. These students then become part of the extended group of Project Teach participants that includes Hope student mentors, all other current Project Teach students still in high school, Project Teach students who are currently Hope students, the Project Teach Director, and faculty advisors. The extended Project Teach group meets once a month during the academic year for a social event planned by one mentor/student pair. The mentors also meet monthly with the Program Director to discuss the progress of each Project Teach student. If these students retain their high grade point average throughout high school, they are provided with a full four-year scholarship to Hope College.

9. Quality Educational Programs

a. Natural Science Division

The Division of Natural Sciences at Hope includes the departments of Biology, Chemistry, Computer Science, Geological & Environmental Sciences, Mathematics, Nursing, and Physics and totals over 60 FTE faculty. Hope College has a long-standing commitment to provide students opportunities to learn cutting-edge science in coherent and rigorous laboratory course that stress hands-on, research-based modes of learning, and to work in a collaborative manner with faculty in research. The Division of Natural Sciences at Hope is recognized by Project Kaleidoscope as a whole "Program that Works" and as a model for other institutions, and is one of only one of the 10 liberal arts institutions to be recently recognized by the NSF with an Award for the Integration of Research and Education. Additionally, the undergraduate research program at Hope has been identified in *U.S. News & World Report* as among the leading programs in the nation (ranked 4th among all institutions in 2003).

The mission of the program in science and mathematics at Hope mirrors that of the college to provide an **innovative curriculum**, which intertwines **student learning** and **faculty development**. We operate on the principle that undergraduate research is an essential component of good teaching and effective learning. The collegial culture within the Division of Natural Sciences is the key ingredient in sustaining an intellectually vital learning community for faculty and students. Our community is enriched by several seminar series that bring as many as 3 external speakers/week to campus. In this way students and faculty learn together and take what they have learned back to the classrooms and research laboratories. Students work in a collaborative fashion in a number of ways, and upper-level students serve as mentors and role models for younger students in formal and informal capacities. Faculty are expected to be scholar/educators, and the administration is expected to sustain an infrastructure and environment to support student and faculty activities. On the average, Hope science faculty/administrators write grant proposals that result in awards totaling greater than one million dollars annually in

new resources from extramural sources to support our research, educational and outreach programs.

Our goal at Hope College is to prepare students to be productive members of the scientific community who are able to pursue a variety of career opportunities. We aim to instill in them an appreciation for the art of the scientific endeavor. Student learning in our programs for the science/mathematics major is embedded in a curriculum that is challenging and provides individual attention to promote scientific growth. It is a research-rich environment in which faculty and students see themselves as partners in the learning process.

We seek to identify and sustain students who have a diversity of ethnic backgrounds. To assist us in this regard we have formed a unique partnership with the University of Michigan to cooperative recruit students of color for fully-supported undergraduate education at Hope College followed by fully-supported graduate and/or medical education at the University of Michigan. This highly successful program, along with outreach programs to K-12 students representing traditionally underrepresented groups in science and mathematics work together to assist us in our goal to provide opportunities for science/mathematics education to all individuals.

We expect students to leave Hope with an ability to understand, communicate, and critically appraise different ways of knowing and to be fully capable of making critical judgments about a fundamental body of knowledge. An unusually high number of students (~40%) enter Hope with an interest in science and mathematics. During their days at Hope we integrate students into a supportive community of learners that provides an environment rich in research-based learning opportunities. Although we do not have a research requirement, ~85% of Hope science and mathematics majors do research. Approximately 33% of Hope College seniors graduate with a degree in science or mathematics. Of these, ~30% enter graduate school. According to a recent NSF study, our record in training students who achieve the Ph.D. is one of the strongest nationally. About 35% of our science-mathematics graduates seek to enter professional school. The 10-year acceptance rate for these students is 71%, and it is 90% for students who engage in research while at Hope. The remaining students enter the workforce directly upon graduation, with many entering the teaching profession as K-12 educators.

Faculty and students sustain vitality by engaging in research. Hope College faculty rank 4th of all liberal arts institutions for numbers of faculty research publications and 14th overall for highest impact of those publications as measured by the Science Citation Index. Since 1990 over 300 undergraduate students have co-authored research publications with faculty. Corporate and university recruiters have identified the value-added component of experience in research/teaching laboratories as an important attribute that students carry with them beyond Hope. Research in and out of the classroom promotes students' critical thinking, reasoning and problem solving, traits that are essential to success in any endeavor. The success of our research-based education program in science and mathematics is evident in its impact on the college at large. Hope recently instituted a collaborative research program for faculty and students in the

humanities, social sciences, and arts, and collaborative research with students is an expected norm of every new faculty hire. This has resulted, in part, in a newly revised institutional core curriculum that emphasizes interdisciplinary learning.

b. Teacher Education Program

Teacher Education has a long history at Hope College. Elementary teachers were prepared for the teacher exams as early as 1853 at the Hope Academy. When Hope College was chartered in 1866 the secondary teacher program began. In 1975 Hope College faculty implemented a Special Education program. The Education faculty has sought national accreditations since the early 1960's. Our most recent successful review was conducted by outside examiners in March 2003. The Department is accredited by the National Council for Accreditation of Teacher Education (NCATE). Only 500 of the 1200 departments/colleges of education nationwide have received this recognition.

Since the early 1990's, instructional technology has been integrated into all of our education coursework, guided by national standards articulated by the International Society for Technology Education (ISTE). In 2002 the Department's efforts were recognized with one of only six national awards, ours being the only small liberal arts college.

The Hope College Department of Education's mission is "to prepare teachers with the knowledge, skills, attitudes and values necessary to make and implement professional decisions in a changing world." The 13 full-time faculty members and 5 adjunct professors are dedicated to ensuring that this mission becomes reality by nurturing six professional abilities in their students through course activities and assignments, research opportunities and developing professional relationships. These abilities will enable a graduate to act as:

- an effective communicator
- a professional collaborator
- a curriculum developer
- a problem solver
- a decision maker
- a scholarly educator

Student-led chapters of national organizations, Council for Exceptional Children and Association of Supervision and Curriculum Development, offer professional development and service opportunities for teacher education programs.

Graduates of Hope's education program teach in public schools and private K-12 schools around the country. Most graduates pursue advanced studies for continuing certification and to complete graduate degrees in special areas of education, such as reading, curriculum development, special education, counseling and administration.

Biographical Sketch

Principal Investigator

Herbert L. Dershem

Department of Computer Science
Hope College
27 Graves Place
Holland, Michigan 49423 USA
616-395-7508
dershem@cs.hope.edu

PROFESSIONAL PREPARATION:

Institution	Major	Degree & Year
University of Dayton, Dayton, OH	Mathematics	BS. 1965
Purdue University, West Lafayette, IN	Computer Science	MS. 1967
Purdue University, West Lafayette, IN	Computer Science	Ph.D 1969

APPOINTMENTS:

Interim Dean of the Natural Sciences, Hope College, 2005.

Professor of Computer Science, Hope College, 1981 - present.

Associate Professor of Computer Science, Hope College, 1974 - 1981.

Assistant Professor of Mathematics and Computer Science, Hope College, 1969 - 1974.

Distinguished Visiting Professor, United States Air Force Academy, 1993- 1994.

Visiting Professor, Boston University Overseas Program, 1982 - 1983.

Visiting Research Scientist, Oak Ridge National Laboratories, 1977 - 1978.

OTHER SIGNIFICANT PUBLICATIONS:

- Dershem, H.L., McFall, R.L., and N. Uti*, "A Linked List Prototype for the Visual Representation of Abstract Data Types," *Interactive Multimedia Electronic Journal of Computer-Enhanced Learning*, 4,2(Oct, 2002).
- Dershem, H.L., McFall, R.L., and N. Uti*, "Animation of Java Linked Lists," *SIGCSE Bulletin*, 34,1(Mar, 2001), 53-57.
- Dershem, H.L., Dykstra*, J., and K. Suppes*, "An Abstract Window Toolkit Visualizer for Computer Science Instruction," *Proceedings of the 33rd Midwest Instruction and Computing Symposium (CD-ROM)*, April 14-15, 2000, Minneapolis, MN.
- Dershem, H.L., Parker*, D.E., and R. Weinhold*, "A Java Function Visualizer," *Journal of Computing in Small Colleges*, 15,1(Oct, 1999), 221-230.
- Dershem, H.L. and J. Vanderhyde*, "Java Class Visualization for Teaching Object-Oriented Concepts," *SIGCSE Bulletin*, 30,1(Mar, 1998), 53-57.
- Dershem, H.L. and P. Brummund*, "Tools for Web-Based Sorting Animation," *SIGCSE Bulletin*, 30,1(Mar, 1998), 222-226.
- Dershem, H.L., Barth*, W., Bowsher*, C., and D. Brown*, "Data Structures with Ada Packages, Laboratories, and Animations," *Proceedings of the First Australasian Conference on Computer Science Education*, July, 1996, 32-38.

Dershem, H.L. and M.J. Jipping, *Programming Languages: Models and Structures: Second Edition*, PWS Publishing Co., 1995.
McFall*, R. and Dershem, "Finite State Machine Simulation in an Introductory Lab," *SIGCSE Bulletin*, 26,1(Mar 1994), 126-140.

SYNERGISTIC ACTIVITIES:

Previous grants awarded:

Co-director, "Introduction of the Computer in the Statistics Curriculum", NSF Office of Computing Activities, 1971-1973, \$45,800.
Director, "A Modular Approach to the Introductory Course in Computer Science", NSF Local Course Improvement Program, 1978-1980, \$14,200
Co-Director, "A Microcomputer Laboratory for use in Teaching Statistics", NSF Instructional Scientific Equipment Program, 1979-1980, 10,315.
Director, "CSNET Membership in Support of Computer Science Research", NSF RUI Program, 1987-1990, \$9,375.
Director, "Computer Science Undergraduate Research Program", NSF REU Program, 1992-1994, \$86,550; 1995-1997, \$114,393; 1998-2000, \$146,700; 2001-2003, \$163,213, 2004-2008, \$352,250.
Director, "Use of Ada, Laboratories, and Visualization in the Teaching of Data Structures and Discrete Mathematics", DARPA Curriculum Development Grant, 1993- 1994, \$23,010.
Director, "Curriculum and Textbook Development Using Ada 9X for the Teaching of Object-Oriented Concepts", US Air Force Contract, 1995-1996, \$34,464.
Co-Director, "An Integrated Classroom/Laboratory for Introducing Students to Object Oriented Concepts", NSF ILI Program, 1996-1998, \$46,356.
Director, "CSEMS Scholarship Program in Computer Science, Engineering, and Mathematics," NSF CSEMS Program, 2004-2008, \$398,040.

Outreach:

Conducted many workshops, short courses, and courses for credit on the use of technology in education for Hope College and Central Michigan University.

COLLABORATORS & OTHER AFFILIATIONS:

Collaborators:

Scott Grissom (Grand Valley State University)
Mike Jipping (Hope College)
Ryan McFall (Hope College)
Myles McNally (Alma College)
Thomas Naps (University of Wisconsin – Oshkosh)
Samuel Rebelsky (Grinnell College)
Henry Walker (Grinnell College)

Graduate and Post Doctoral Advisors:

Robert E. Lynch (Purdue University)

Biographical Sketch

Co-Principal Investigator

Teunis Donk

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PROFESSIONAL PREPARATION

Institution	Major	Degree & Year
Western Michigan University	English/Elementary Education	B.A. 1977
Western Michigan University	Social Work	M.S.W. 1983
Michigan State University	Curriculum, Teaching and Educational Policy	Ph.D. 1996

APPOINTMENTS

Associate Professor of Education, Hope College, 1996 – present

Assistant Professor of Education, HTP Program, Hope College, 1987 - 1992

Teacher, West Ottawa Public Schools, 1977 – 1996

PUBLICATIONS RELATED TO PROPOSED RESEARCH:

OTHER SIGNIFICANT PUBLICATIONS:

Dell'Olio, J. & Donk, T. (In Process). *Using models of teaching to address content standards*. Thousand Oaks, CA: Sage Publications.

Donk, T. (2004). TE reform: Learning to teach writing – Can theory, research and teaching models really influence practice? In: R.J. Mezeske & B. Mezeske (Eds.), *Reforming teacher education in the liberal arts setting*. New York: Peter Lang Publishers.

Donk, T. (1996). *Limitations of theory in guiding on-line decision-making in process writing contexts: The case of Emily*. Doctoral dissertation, Michigan State University.

Donk, T. (1994). Writing skills: Are they part of the process? *Michigan Reading Journal*, (27) 3, 13 – 17.

Donk, T & Reagan-Donk, T.E. (1992). *Literacy through teamwork*. Holland, MI: Love, Inc./World Vision.

SYNERGISTIC ACTIVITIES

Previous grants awarded:

Director, U.S. Department of Education Student Literacy Corp Grant, 1990-92.

Curriculum Development:

Developed and taught "Created Equal: A Vision or Reality in American Schooling" as a First Year Seminar for liberal arts students at Hope College.

Outreach:

Conducted trainings in literacy and pedagogy for K-12 teachers, including: Holland Public Schools, Coloma Public Schools, Wyoming Public Schools, and Coopersville Public Schools – all in Michigan. Presented at several statewide, national, and international conferences, including: The International Literacy and Education Research Network Conference on Learning, Association for Supervision and Curriculum Development Annual Conference, Michigan Reading Association Conference, and the International Reading Association Conference (upcoming).

COLLABORATORS AND OTHER AFFILIATIONS

Collaborators:

Jeanine Dell'Olio, (Hope College)

Richard Mezeske, (Hope College)

Graduate and Post Doctoral Advisors:

Susan Florio-Ruane (Michigan State University)

Diane Holt-Reynolds (Deceased)

Biographical Sketch
Co-Principal Investigator

John J. Krupeczak, Jr.

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Holland, Michigan 49423 USA
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PROFESSIONAL PREPARATION:

Institution	Major	Degree & Year
Williams College, Williamstown MA	Physics	BA. 1980
University of Massachusetts, Amherst, MA	Mechanical Engineering	MS. 1986
University of Massachusetts, Amherst, MA	Mechanical Engineering	Ph.D 1994

APPOINTMENTS:

Associate Professor of Engineering and Engineering Program Director, Hope College, 2000-present.

Assistant Professor of Engineering, Hope College, 1997-2000.

Visiting Assistant Professor of Engineering, Hope College, 1994 - 1996.

Cryogenics Engineer, Superconducting Super Collider Laboratory, Dallas, Texas, 1992- 1994.

Research Assistant, Williams College Hydrogen Maser Laboratory, 1998 - 1992.

Research and Teaching Assistant, Mechanical Engineering Department,
University of Massachusetts, Amherst, 1983 - 1987.

Research Technician, GTE Inc., Advanced Technology Laboratory.
Waltham, Massachusetts, 1982 - 1983.

OTHER SIGNIFICANT PUBLICATIONS:

Krupeczak, J.J "Reaching Out Across Campus: Engineers as Champions of Technological Literacy," *Liberal Education in the 21st Century*, Worcester Polytechnic Institute Series on Studies in Science, Technology, and Culture, H. Luegengbil, K. Neeley, and D. Ollis, editors, Peter Lang Publishers, New York, 2004).

Krupeczak, J. J., N. Bair, T. Benson, P. Berke, D. Corlew, K. Lantz, D. Lappenga, M. Scholtens, and D. Woessner, "Hands-on Laboratory Projects for Non-Science Majors: Learning Principles of Physics in the Context of Everyday Technology," *American Society for Engineering Education Ann. Conf. Proc.* (2000).

Krupeczak, J.J and C. Green "The Perspective of Non-Engineers on Technological Literacy," *American Society for Engineering Education Ann. Conf. Proc.* (1999).

Krupeczak, J.J "Demystifying Technology," *American Society for Engineering Education PRISM*, October (1997) 30-34.

Krupeczak, J.J "Science and Technology of Everyday Life: A course on technology for liberal arts students," *American Society for Engineering Education Ann. Conf. Proc.* (1996).

Pinkerton LR., J.J. Krupczak et al., "An Apparatus to Measure Force in a Simple Truss System," *Frontiers in Education Conference*, (2002).

Krupczak, J.J., B. Mulder, and J.D. vanPutten, "Multidisciplinary Student Experiences in a Liberal Arts Engineering Program," *American Society for Engineering Education Ann. Conf. Proc.* (1997).

Krupczak, J. J., D.R. McAllaster, S.B. Crampton, A.L. Cole, and A.J. Kerman "A Cryogenic Hydrogen Maser Operating at 10 K." *Adv. Cryo. Engr.* 40 (1995)286.

Deis G., R. Warren, D. Richied, N. Martovetsky, J.J. Krupczak, A. Sidi-Yekhlief, J. Pace, and C. Collins, "A Liquid Helium Cryogenic System Design for the GEM Magnet," *Adv. Cryo. Engr.* 39 (1994) 389.

Krupczak, J. J., R. Fox, K. Hawkes, H. Hazlett, D. Richied, C. Shipp, A. Sidi-Yekhlief, K. Stringfellow, Li-Juan Wei, M. Wilson, "Initial Design of the Cryogenics System for the GEM Calorimeter Module Test," Superconducting Super Collider Laboratory GEM Collaboration Doc: GEM TN-93-531. (Dec. 1993).

SYNERGISTIC ACTIVITIES:

Dissemination: Established a collaboration with Science First Inc., to promote the distribution of kits of materials for laboratory projects developed for non-engineers. Through Science First Inc., some of these kits will be carried by the major science education distributors of Fisher Inc., and Sargent-Welch Inc.

Outreach: Developed and conducted: How Things Work week-long summer camps for K-6 children at Hope College (2001-2002). Conducted an airfoil design project with middle school students from groups underrepresented in science through the Hughes Science Program at Hope College (October 1999). Sponsored the construction of crystal radios by 23 students in Zealand Middle School (May 1999), Carried out workshops at Hope College for high school science teachers on making holograms (October 1998).

Service on National Organizations: Served as organizer and chair of sessions on Technological Literacy at the American Society for Engineering Education Annual Conferences 1998, 1999, and 2004.

Public Information: Interviewed by regional radio stations WYUR Detroit, Michigan and WBT Charlotte, North Carolina to discuss the topic of teaching non-technical students how things work.

Curriculum Development: Developed and taught "Science and Technology of Everyday Life" a course on technology for liberal arts student at Hope College.

COLLABORATORS & OTHER AFFILIATIONS:

Collaborators:

Louis Bloomfield, (University of Virginia)
Stuart Crampton, (Williams College)
Darryl Thelen, (University of Wisconsin-Madison)

Graduate and Post Doctoral Advisors:

T. R. Blake (University of Massachusetts)
Stuart Crampton, (Williams College)

SUMMARY PROPOSAL BUDGET

YEAR 1

ORGANIZATION Hope College				FOR NSF USE ONLY			
				PROPOSAL NO.	DURATION (months)		
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR Herbert L Dershem				AWARD NO.	Proposed	Granted	
A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates (List each separately with title, A.7. show number in brackets)				NSF Funded Person-months		Funds Requested By proposer	Funds granted by NSF (if different)
				CAL	ACAD	SUMR	
1. Herbert L Dershem - PI				0.00	0.50	0.00	\$ 6,000
2. Tony Donk - co-PI				0.00	0.00	0.00	0
3. John J Krupczak - co-PI				0.00	0.00	0.00	0
4.							
5.							
6. (0) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)				0.00	0.00	0.00	0
7. (3) TOTAL SENIOR PERSONNEL (1 - 6)				0.00	0.50	0.00	6,000
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)							
1. (0) POST DOCTORAL ASSOCIATES				0.00	0.00	0.00	0
2. (0) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)				0.00	0.00	0.00	0
3. (0) GRADUATE STUDENTS							0
4. (0) UNDERGRADUATE STUDENTS							0
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)							0
6. (0) OTHER							0
TOTAL SALARIES AND WAGES (A + B)							6,000
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)							0
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)							6,000
D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEEDING \$5,000.)							
TOTAL EQUIPMENT							0
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSESSIONS)							0
2. FOREIGN							0
F. PARTICIPANT SUPPORT COSTS							
1. STIPENDS \$ 50,000							
2. TRAVEL							0
3. SUBSISTENCE							0
4. OTHER							0
TOTAL NUMBER OF PARTICIPANTS (5) TOTAL PARTICIPANT COSTS							50,000
G. OTHER DIRECT COSTS							
1. MATERIALS AND SUPPLIES							1,000
2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION							0
3. CONSULTANT SERVICES							6,000
4. COMPUTER SERVICES							0
5. SUBAWARDS							0
6. OTHER							0
TOTAL OTHER DIRECT COSTS							7,000
H. TOTAL DIRECT COSTS (A THROUGH G)							63,000
I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) (Rate: , Base:)							
TOTAL INDIRECT COSTS (F&A)							0
J. TOTAL DIRECT AND INDIRECT COSTS (H + I)							63,000
K. RESIDUAL FUNDS (IF FOR FURTHER SUPPORT OF CURRENT PROJECTS SEE GPG II.C.6.j.)							0
L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)							\$ 63,000 \$
M. COST SHARING PROPOSED LEVEL \$ 0				AGREED LEVEL IF DIFFERENT \$			
PI/PD NAME Herbert L Dershem				FOR NSF USE ONLY			
ORG. REP. NAME* Tracey arndt				INDIRECT COST RATE VERIFICATION			
				Date Checked	Date Of Rate Sheet	Initials - ORG	

1 *ELECTRONIC SIGNATURES REQUIRED FOR REVISED BUDGET

SUMMARY PROPOSAL BUDGET

YEAR 2

ORGANIZATION Hope College				FOR NSF USE ONLY		
				PROPOSAL NO.	DURATION (months)	
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR Herbert L Dershem				AWARD NO.	Proposed	Granted
A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates (List each separately with title, A.7. show number in brackets)				NSF Funded Person-months		Funds Requested By proposer
				CAL	ACAD	SUMR
1. Herbert L Dershem - PI				0.00	0.50	0.00 \$ 6,000
2. Tony Donk - co-PI				0.00	0.00	0.00 0
3. John J Krupczak - co-PI				0.00	0.00	0.00 0
4.						
5.						
6. (0) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)				0.00	0.00	0.00 0
7. (3) TOTAL SENIOR PERSONNEL (1 - 6)				0.00	0.50	0.00 6,000
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)						
1. (0) POST DOCTORAL ASSOCIATES				0.00	0.00	0.00 0
2. (0) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)				0.00	0.00	0.00 0
3. (0) GRADUATE STUDENTS						0
4. (0) UNDERGRADUATE STUDENTS						0
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)						0
6. (0) OTHER						0
TOTAL SALARIES AND WAGES (A + B)						6,000
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)						0
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)						6,000
D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEEDING \$5,000.)						
TOTAL EQUIPMENT						0
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSESSIONS)						0
2. FOREIGN						0
F. PARTICIPANT SUPPORT COSTS						
1. STIPENDS \$ 100,000						
2. TRAVEL 0						
3. SUBSISTENCE 0						
4. OTHER 0						
TOTAL NUMBER OF PARTICIPANTS (10) TOTAL PARTICIPANT COSTS						100,000
G. OTHER DIRECT COSTS						
1. MATERIALS AND SUPPLIES						1,000
2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION						0
3. CONSULTANT SERVICES						4,000
4. COMPUTER SERVICES						0
5. SUBAWARDS						0
6. OTHER						0
TOTAL OTHER DIRECT COSTS						5,000
H. TOTAL DIRECT COSTS (A THROUGH G)						111,000
I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) (Rate: , Base:)						
TOTAL INDIRECT COSTS (F&A)						0
J. TOTAL DIRECT AND INDIRECT COSTS (H + I)						111,000
K. RESIDUAL FUNDS (IF FOR FURTHER SUPPORT OF CURRENT PROJECTS SEE GPG II.C.6.j.)						0
L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)						\$ 111,000 \$
M. COST SHARING PROPOSED LEVEL \$ 0				AGREED LEVEL IF DIFFERENT \$		
PI/PD NAME Herbert L Dershem				FOR NSF USE ONLY		
ORG. REP. NAME* Tracey arndt				INDIRECT COST RATE VERIFICATION		
		Date Checked		Date Of Rate Sheet		Initials - ORG

2 *ELECTRONIC SIGNATURES REQUIRED FOR REVISED BUDGET

SUMMARY PROPOSAL BUDGET

YEAR 3

ORGANIZATION Hope College				FOR NSF USE ONLY			
				PROPOSAL NO.	DURATION (months)		
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR Herbert L. Dershem				AWARD NO.	Proposed	Granted	
A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates (List each separately with title, A.7. show number in brackets)				NSF Funded Person-months		Funds Requested By proposer	Funds granted by NSF (if different)
				CAL	ACAD	SUMR	
1. Herbert L. Dershem - PI				0.00	0.50	0.00	\$ 6,000
2. Tony Donk - co-PI				0.00	0.00	0.00	0
3. John J. Krupczak - co-PI				0.00	0.00	0.00	0
4.							
5.							
6. (0) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)				0.00	0.00	0.00	0
7. (3) TOTAL SENIOR PERSONNEL (1 - 6)				0.00	0.50	0.00	6,000
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)							
1. (0) POST DOCTORAL ASSOCIATES				0.00	0.00	0.00	0
2. (0) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)				0.00	0.00	0.00	0
3. (0) GRADUATE STUDENTS							0
4. (0) UNDERGRADUATE STUDENTS							0
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)							0
6. (0) OTHER							0
TOTAL SALARIES AND WAGES (A + B)							6,000
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)							0
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)							6,000
D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEEDING \$5,000.)							
TOTAL EQUIPMENT							0
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSESSIONS)							0
2. FOREIGN							0
F. PARTICIPANT SUPPORT COSTS							
1. STIPENDS \$ 100,000							
2. TRAVEL 0							
3. SUBSISTENCE 0							
4. OTHER 0							
TOTAL NUMBER OF PARTICIPANTS (10) TOTAL PARTICIPANT COSTS							100,000
G. OTHER DIRECT COSTS							
1. MATERIALS AND SUPPLIES							1,000
2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION							0
3. CONSULTANT SERVICES							4,000
4. COMPUTER SERVICES							0
5. SUBAWARDS							0
6. OTHER							0
TOTAL OTHER DIRECT COSTS							5,000
H. TOTAL DIRECT COSTS (A THROUGH G)							111,000
I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) (Rate: , Base:)							
TOTAL INDIRECT COSTS (F&A)							0
J. TOTAL DIRECT AND INDIRECT COSTS (H + I)							111,000
K. RESIDUAL FUNDS (IF FOR FURTHER SUPPORT OF CURRENT PROJECTS SEE GPG II.C.6.j.)							0
L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)							\$ 111,000 \$
M. COST SHARING PROPOSED LEVEL \$ 0				AGREED LEVEL IF DIFFERENT \$			
PI/PD NAME Herbert L. Dershem				FOR NSF USE ONLY			
ORG. REP. NAME* Tracey arndt				INDIRECT COST RATE VERIFICATION			
		Date Checked		Date Of Rate Sheet		Initials - ORG	

3 *ELECTRONIC SIGNATURES REQUIRED FOR REVISED BUDGET

SUMMARY PROPOSAL BUDGET

YEAR 4

ORGANIZATION Hope College				FOR NSF USE ONLY			
				PROPOSAL NO.	DURATION (months)		
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR Herbert L Dershem				AWARD NO.	Proposed	Granted	
A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates (List each separately with title, A.7. show number in brackets)				NSF Funded Person-months		Funds Requested By proposer	Funds granted by NSF (if different)
	CAL	ACAD	SUMR				
1. Herbert L Dershem - PI	0.00	0.50	0.00	\$	6,000	\$	
2. Tony Donk - co-PI	0.00	0.00	0.00		0		
3. John J Krupczak - co-PI	0.00	0.00	0.00		0		
4.							
5.							
6. (0) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)	0.00	0.00	0.00		0		
7. (3) TOTAL SENIOR PERSONNEL (1 - 6)	0.00	0.50	0.00		6,000		
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)							
1. (0) POST DOCTORAL ASSOCIATES	0.00	0.00	0.00		0		
2. (0) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	0.00	0.00	0.00		0		
3. (0) GRADUATE STUDENTS					0		
4. (0) UNDERGRADUATE STUDENTS					0		
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)					0		
6. (0) OTHER					0		
TOTAL SALARIES AND WAGES (A + B)					6,000		
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)					0		
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)					6,000		
D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEEDING \$5,000.)							
TOTAL EQUIPMENT					0		
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSESSIONS)					0		
2. FOREIGN					0		
F. PARTICIPANT SUPPORT COSTS							
1. STIPENDS \$	50,000						
2. TRAVEL	0						
3. SUBSISTENCE	0						
4. OTHER	0						
TOTAL NUMBER OF PARTICIPANTS (5) TOTAL PARTICIPANT COSTS					50,000		
G. OTHER DIRECT COSTS							
1. MATERIALS AND SUPPLIES					1,000		
2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION					0		
3. CONSULTANT SERVICES					4,000		
4. COMPUTER SERVICES					0		
5. SUBAWARDS					0		
6. OTHER					0		
TOTAL OTHER DIRECT COSTS					5,000		
H. TOTAL DIRECT COSTS (A THROUGH G)					61,000		
I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) (Rate: , Base:)							
TOTAL INDIRECT COSTS (F&A)					0		
J. TOTAL DIRECT AND INDIRECT COSTS (H + I)					61,000		
K. RESIDUAL FUNDS (IF FOR FURTHER SUPPORT OF CURRENT PROJECTS SEE GPG II.C.6.j.)					0		
L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)				\$	61,000	\$	
M. COST SHARING PROPOSED LEVEL \$ 0				AGREED LEVEL IF DIFFERENT \$			
PI/PD NAME Herbert L Dershem				FOR NSF USE ONLY			
ORG. REP. NAME* Tracey arndt				INDIRECT COST RATE VERIFICATION			
		Date Checked		Date Of Rate Sheet		Initials - ORG	

SUMMARY PROPOSAL BUDGET

Cumulative

ORGANIZATION Hope College				FOR NSF USE ONLY		
				PROPOSAL NO.	DURATION (months) Proposed Granted	
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR Herbert L Dershem				AWARD NO.		
A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates (List each separately with title, A.7. show number in brackets)				NSF Funded Person-months	Funds Requested By proposer	Funds granted by NSF (if different)
				CAL	ACAD	SUMR
1. Herbert L Dershem - PI				0.00	2.00	0.00 \$ 24,000
2. Tony Donk - co-PI				0.00	0.00	0.00 0
3. John J Krupczak - co-PI				0.00	0.00	0.00 0
4.						
5.						
6. () OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)				0.00	0.00	0.00 0
7. (3) TOTAL SENIOR PERSONNEL (1 - 6)				0.00	2.00	0.00 24,000
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)						
1. (0) POST DOCTORAL ASSOCIATES				0.00	0.00	0.00 0
2. (0) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)				0.00	0.00	0.00 0
3. (0) GRADUATE STUDENTS						0
4. (0) UNDERGRADUATE STUDENTS						0
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)						0
6. (0) OTHER						0
TOTAL SALARIES AND WAGES (A + B)						24,000
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)						0
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)						24,000
D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEEDING \$5,000.)						
TOTAL EQUIPMENT						0
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSESSIONS)						0
2. FOREIGN						0
F. PARTICIPANT SUPPORT COSTS						
1. STIPENDS \$ 300,000						
2. TRAVEL 0						
3. SUBSISTENCE 0						
4. OTHER 0						
TOTAL NUMBER OF PARTICIPANTS (30) TOTAL PARTICIPANT COSTS						300,000
G. OTHER DIRECT COSTS						
1. MATERIALS AND SUPPLIES						4,000
2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION						0
3. CONSULTANT SERVICES						18,000
4. COMPUTER SERVICES						0
5. SUBAWARDS						0
6. OTHER						0
TOTAL OTHER DIRECT COSTS						22,000
H. TOTAL DIRECT COSTS (A THROUGH G)						346,000
I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE)						
TOTAL INDIRECT COSTS (F&A)						0
J. TOTAL DIRECT AND INDIRECT COSTS (H + I)						346,000
K. RESIDUAL FUNDS (IF FOR FURTHER SUPPORT OF CURRENT PROJECTS SEE GPG II.C.6.j.)						0
L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)						\$ 346,000 \$
M. COST SHARING PROPOSED LEVEL \$ 0				AGREED LEVEL IF DIFFERENT \$		
PI/PD NAME Herbert L Dershem				FOR NSF USE ONLY		
ORG. REP. NAME* Tracey arndt				INDIRECT COST RATE VERIFICATION		
				Date Checked	Date Of Rate Sheet	Initials - ORG

C *ELECTRONIC SIGNATURES REQUIRED FOR REVISED BUDGET

Budget Justification for Cumulative Budget

Senior Personnel

One month of release time each academic year is provided for the PI, Herbert L. Dershem. This is budgeted at \$6,000 per year, the cost of hiring part-time faculty to teach one course, allowing Dr. Dershem one course release time each semester to direct the administration, reporting, and evaluation functions of this project.

Participant Support Costs

The stipend allowance will provide the scholarships of \$10,000 per academic year. This will support five students during years 1 and 4 and ten students during years 2 and 3.

Materials and Supplies

This is budgeted at \$1,000 per year to pay for publicity materials and recruiting costs.

Consultant Services

The Carl Frost Research Center will design and implement all of the evaluation activities of this project. Their services will cost \$6,000 in year 1 and \$4,000 per year in the remaining three years.

Current and Pending Support

(See GPG Section II.C.2.h for guidance on information to include on this form.)

The following information should be provided for each investigator and other senior personnel. Failure to provide this information may delay consideration of this proposal.			
Investigator: Herbert Dershem	Other agencies (including NSF) to which this proposal has been/will be submitted.		
Support: <input type="checkbox"/> Current <input checked="" type="checkbox"/> Pending <input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support Project/Proposal Title: Hope College Robert Noyce Scholarship Program			
Source of Support: National Science Foundation Total Award Amount: \$ 346,000 Total Award Period Covered: 01/01/06 - 12/31/09 Location of Project: Hope College Person-Months Per Year Committed to the Project. Cal: 0.00 Acad: 1.00 Sumr: 0.00			
Support: <input checked="" type="checkbox"/> Current <input type="checkbox"/> Pending <input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support Project/Proposal Title: REU Site: An Undergraduate Research Participation Program in Computer Science			
Source of Support: National Science Foundation - REU Total Award Amount: \$ 352,250 Total Award Period Covered: 04/01/04 - 03/31/09 Location of Project: Hope College Person-Months Per Year Committed to the Project. Cal: 0.00 Acad: 0.50 Sumr: 0.50			
Support: <input checked="" type="checkbox"/> Current <input type="checkbox"/> Pending <input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support Project/Proposal Title: CSEMS Scholarship Program in Computer Science, Engineering, and Mathematics at Hope College			
Source of Support: National Science Foundation - CSEMS Total Award Amount: \$ 398,040 Total Award Period Covered: 08/01/04 - 07/31/08 Location of Project: Hope College Person-Months Per Year Committed to the Project. Cal: 0.00 Acad: 0.00 Sumr: 0.50			
Support: <input type="checkbox"/> Current <input type="checkbox"/> Pending <input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support Project/Proposal Title:			
Source of Support: Total Award Amount: \$ Total Award Period Covered: Location of Project: Person-Months Per Year Committed to the Project. Cal: Acad: Sumr:			
Support: <input type="checkbox"/> Current <input type="checkbox"/> Pending <input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support Project/Proposal Title:			
Source of Support: Total Award Amount: \$ Total Award Period Covered: Location of Project: Person-Months Per Year Committed to the Project. Cal: Acad: Summ:			

*If this project has previously been funded by another agency, please list and furnish information for immediately preceding funding period.

Current and Pending Support

(See GPG Section II.C.2.h for guidance on information to include on this form.)

The following information should be provided for each investigator and other senior personnel. Failure to provide this information may delay consideration of this proposal.

Investigator: Tony Donk	Other agencies (including NSF) to which this proposal has been/will be submitted.
--------------------------------	---

Support: <input type="checkbox"/> Current <input checked="" type="checkbox"/> Pending <input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support	
Project/Proposal Title: Hope College Robert Noyce Scholarship Program	
Source of Support: National Science Foundation - Robert Noyce Scholarship	
Total Award Amount: \$ 345,000 Total Award Period Covered: 01/01/06 - 12/31/09	
Location of Project: Hope College	
Person-Months Per Year Committed to the Project. Cal: 0.00 Acad: 0.00 Sumr: 0.00	

Support: <input type="checkbox"/> Current <input type="checkbox"/> Pending <input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support	
Project/Proposal Title:	
Source of Support:	
Total Award Amount: \$ Total Award Period Covered:	
Location of Project:	
Person-Months Per Year Committed to the Project. Cal: Acad: Sumr:	

Support: <input type="checkbox"/> Current <input type="checkbox"/> Pending <input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support	
Project/Proposal Title:	
Source of Support:	
Total Award Amount: \$ Total Award Period Covered:	
Location of Project:	
Person-Months Per Year Committed to the Project. Cal: Acad: Sumr:	

Support: <input type="checkbox"/> Current <input type="checkbox"/> Pending <input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support	
Project/Proposal Title:	
Source of Support:	
Total Award Amount: \$ Total Award Period Covered:	
Location of Project:	
Person-Months Per Year Committed to the Project. Cal: Acad: Sumr:	

Support: <input type="checkbox"/> Current <input type="checkbox"/> Pending <input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support	
Project/Proposal Title:	
Source of Support:	
Total Award Amount: \$ Total Award Period Covered:	
Location of Project:	
Person-Months Per Year Committed to the Project. Cal: Acad: Summ:	

*If this project has previously been funded by another agency, please list and furnish information for immediately preceding funding period.

Current and Pending Support

(See GPG Section II.C.2.h for guidance on information to include on this form.)

The following information should be provided for each investigator and other senior personnel. Failure to provide this information may delay consideration of this proposal.			
Investigator: John Krupczak	Other agencies (including NSF) to which this proposal has been/will be submitted.		
Support: <input type="checkbox"/> Current <input checked="" type="checkbox"/> Pending <input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support Project/Proposal Title: Hope College Robert Noyce Scholarship Program			
Source of Support: National Science Foundation - Robert Noyce Total Award Amount: \$ 346,000 Total Award Period Covered: 01/01/06 - 12/31/09 Location of Project: Hope College Person-Months Per Year Committed to the Project. Cal: 0.00 Acad: 0.00 Sumr: 0.00			
Support: <input checked="" type="checkbox"/> Current <input type="checkbox"/> Pending <input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support Project/Proposal Title: A Case Study of an Established Technological Literacy Course			
Source of Support: National Science Foundation - BEE Total Award Amount: \$ 74,884 Total Award Period Covered: 09/01/03 - 08/31/05 Location of Project: Hope College Person-Months Per Year Committed to the Project. Cal: 0.00 Acad: 0.00 Sumr: 1.00			
Support: <input checked="" type="checkbox"/> Current <input type="checkbox"/> Pending <input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support Project/Proposal Title: Technology Literacy Workshop			
Source of Support: National Science Foundation - CCLI Total Award Amount: \$ 49,900 Total Award Period Covered: 08/01/04 - 08/01/05 Location of Project: Hope College Person-Months Per Year Committed to the Project. Cal: 0.00 Acad: 0.00 Sumr: 1.00			
Support: <input type="checkbox"/> Current <input type="checkbox"/> Pending <input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support Project/Proposal Title:			
Source of Support: Total Award Amount: \$ _____ Total Award Period Covered: _____ Location of Project: _____ Person-Months Per Year Committed to the Project. Cal: _____ Acad: _____ Sumr: _____			
Support: <input type="checkbox"/> Current <input type="checkbox"/> Pending <input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support Project/Proposal Title:			
Source of Support: Total Award Amount: \$ _____ Total Award Period Covered: _____ Location of Project: _____ Person-Months Per Year Committed to the Project. Cal: _____ Acad: _____ Summ: _____			

*If this project has previously been funded by another agency, please list and furnish information for immediately preceding funding period.



HOPE COLLEGE

DEAN FOR THE NATURAL SCIENCES

March 25, 2005

Dr. Herb Dershem
Department of Computer Science
Hope College
Holland, MI 49423

Dear Herb:

I enthusiastically support your NSF Robert Noyce Scholarship proposal. The Hope College Division of Natural Sciences has long been committed to increasing the number of qualified teachers of science at the K-12 level. The proposed scholarship program, by providing financial support for 15 Hope College students to complete their preparation as K-12 science teachers, will make a significant contribution in helping us fulfill this commitment.

I am particularly excited about the way that this project will draw upon other initiatives within the Hope College Division of Natural Sciences. At Hope College, we have a major commitment to the integration of research and learning. It is therefore fitting that this proposal includes the opportunity for the scholarship recipients to participate in research through the college's Howard Hughes Medical Institute project.

Sincerely,

Dr. James Gentile
Dean of Natural Sciences Division



HOPE COLLEGE

CARL FROST CENTER FOR
SOCIAL SCIENCE RESEARCH

National Science Foundation
4201 Wilson Blvd.
Arlington, VA 22230

March 24, 2005

To whom it may concern:

The Frost Research Center has maintained the highest quality services in research design, data analysis and evaluation for over 15 years. The Center has conducted institutional research for Hope College, including teacher assessments and a cultural diversity survey. We have provided local school districts with our services through surveys and data analysis of students post graduate achievements and experiences. Our expertise provided Holland Public Schools with the necessary data to complete evaluation requirements for federal funding.

It is our intent to provide professional evaluation services in a timely and professional manner to the Hope College's Science Division in the event that the Noyce Scholarship program is awarded to students. Our evaluation plan provides support for the program in the implementation phase and also an annual and cumulative report of program results to the project coordinators. This method will enhance program effects and also maintain the accountability required by grant guidelines.

Sincerely,

Eileen Robertson-Rehberg, Ph.D.
Director, The Frost Research Center

VAN ZOEREN HALL / 41 GRAVES PLACE / PO BOX 9000
HOLLAND, MICHIGAN 49422-9000 / 616-395-7556 / FAX 616-395-7410



HOPE COLLEGE

DEAN FOR THE SOCIAL SCIENCES

March 30, 2005

Dr. Herbert Dershem
Computer Science Department
Hope College
Holland, Michigan 49423

Dear Herb,

I am writing to lend my enthusiastic support to your NSF Robert Noyce Scholarship proposal. The Hope College Department of Education and the Social Science Division to which it belongs have been committed to quality K-12 teacher education since the 1850's.

In 2002 Hope's Education Department was re-accredited without weakness by NCATE, the National Council for Accreditation of Teacher Education, and was called, by the external review team, an exemplary teacher education program.

Our Education faculty have also demonstrated, over many years, their commitment to increasing the number of well-qualified K-12 science teachers. In 1989, for example, the Education Department received a \$500,000 grant from the Kellogg Foundation which enhanced the teaching of science for elementary in-service and pre-service teachers. More recently, Hope's Education, Psychology, and Physics/Engineering Departments collaborated in the development of a successful grant proposal to the NSF for a "technological literacy course as a means to address the engineering education of K-12 teachers." That project was just completed in August of 2004.

The proposed scholarship program, which will provide financial support for 15 Hope College students to complete their preparation as K-12 teachers, will contribute further to the excellence we have already attained and which we seek to enhance. The fact that the proposal includes an initiative that will enable the scholarship recipients to take part in research with faculty members also reinforces Hope College's longstanding commitment to undergraduate research.

Sincerely,

Dr. Nancy Miller
Dean for Social Sciences

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This proposal is within a strong tradition of scientific research at Hope College. The teacher preparation program seems to benefit from a close association with this research tradition. The proposal itself seems to emphasize science education. It would be helpful to more deliberately include mathematics as well. The project management team seems very well qualified to implement such a plan, and the members have quite a bit of experience with other NSF projects.

Broader Impact

The increase of the number of STEM teachers will certainly benefit the area. The ability of faculty in a small college setting to develop personal relationships with students in a mentoring role could help in the retention of potential teachers. Systematizing those relationships would add to the experience base for other colleges and universities seeking to do the same.

Summary

This is a solid proposal with clear evidence of a plan to increase the number of STEM teachers. The proposal itself could have elaborated a bit more on some of the details of the implementation plan. There was an impressive listing of programs and activities. It would be helpful to articulate how these programs will contribute to producing new STEM teachers. The interaction among these existing programs is the unique contribution from Hope College. Another item that would have strengthened the proposal itself would have been an indication of school district involvement and support through attached letters. While there has been considerable prior NSF support the outcomes for these projects were not reported.

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Proposal Number: 0531978
Performing Organization: Hope College
NSF Program: Robert Noyce Scholarship Program
Principal Investigator: Dershem, Herbert L
Proposal Title: Hope College Robert Noyce Scholarship Program
Rating: Good

REVIEW:

What is the intellectual merit of the proposed activity?

Hope College seeks to increase both numbers and diversity of graduating STEM educators by offering five scholarships for their final two years of study. Recruitment to the program is limited to existing Hope College undergraduates, although expanding the recruitment to include high school students may also increase the overall numbers of STEM majors, and thereby increase the potential Noyce pool of applicants. Although the summer science camps provide some pre-college recruitment for the STEM disciplines at Hope, a more targeted approach to high-school students would likely provide a higher yield. The proposers need to specify a minimum GPA requirement for Noyce candidates to insure that the pool will draw from strong students in math or the sciences. The bulk of the proposal discusses the programs and curricula in STEM fields. These programs provide a strong base on which to build, but do not address how specifically these programs would be tailored to improve teacher preparation and support, particularly in terms of minority recruitment. The support structure, based on the personal mentoring relationships established between professors and students during their undergraduate experience, is also a good starting point, but perhaps needs to be more highly codified to provide maximum support, particularly for students teaching in high-need areas some distance from the college.

What are the broader impacts of the proposed activity?

The Noyce Scholarship program would likely improve the overall numbers of students entering the K-12 teaching arena in STEM fields. Additionally the presence of qualified STEM educators will also increase the numbers of students who view science and math fields as legitimate career options, potentially increasing the numbers of STEM students at Hope College in the future.

Summary Statement

This proposal perhaps needs to address specific mechanisms for using the strong STEM infrastructure at Hope College to recruit, retain and support teachers of math and science.

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Organization: Hope College

Review #2

Proposal Number: 0531978
Performing Organization: Hope College
NSF Program: Robert Noyce Scholarship Program
Principal Investigator: Dershem, Herbert L
Proposal Title: Hope College Robert Noyce Scholarship Program
Rating: Good

REVIEW:

What is the intellectual merit of the proposed activity?

The evaluation plan is particularly rich. Data on recruitment, implementation, and outcomes will be gathered, and there is real potential to draw meaningful conclusions regarding the success of the program and the role Noyce Fellowships played in supporting Hope in producing excellent new teachers.

What are the broader impacts of the proposed activity?

This program will potentially increase the number and diversity of teachers of science, technology, engineering, and mathematics graduating from Hope College.

Summary Statement

This is a good to very good proposal. Hope is a small private school in Michigan with a strong commitment to the Christian faith and an excellent record in undergraduate science education. For a school of slightly over 3100 students, Hope has an excellent record of producing K-12 certified teachers in the science disciplines. The objective of the proposal is to increase the number and diversity of STEM majors completing a K-12 teaching degree program. Over the past three years they have produced 42 students who have graduated with a certifiable major in science. They are asking for funds to provide scholarships of \$10,000 for each of two years for 15 students in these programs. They have described a reasonable recruitment plan, and state that they will give particular encouragement to students from underrepresented groups. The science undergraduate training appears to be excellent, with an emphasis given to undergraduate research. However it is worrisome, particularly given the high tuition, whether the scholarships will be able to attract an ADDITIONAL 15 new teachers of excellence from a relatively small student population.

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Proposal Number: 0531978
Performing Organization: Hope College
NSF Program: Robert Noyce Scholarship Program
Principal Investigator: Dershem, Herbert L
Proposal Title: Hope College Robert Noyce Scholarship Program
Rating: Good

REVIEW:

What is the intellectual merit of the proposed activity?

Hope College's history of undergraduate research opportunities for science majors would help insure that the science teachers graduating from the program are highly qualified. A Howard Hughes Medical Institute grant will provide research opportunities for two Noyce Scholars a year. The Hope Summer Science Camp will also provide additional opportunities and experience in working with students to the Noyce Scholars. The college also has a long-standing history of collaboration with school partners in the region through providing professional development to teachers, presentations to students, membership on committees and local school boards.

What are the broader impacts of the proposed activity?

The 15 STEM majors who become teachers through the Noyce Scholarship Program will help reduce the instances of out-of-field teaching in science and math. Stronger training will help increase the retention rate during the induction period. Project TEACH provides an opportunity for the college to identify and mentor prospective minority teaching candidates while they are still in high school. Another project, funded by the Templeton Foundation, involves teacher education candidates with minority students for intensive field placement. The small size of the college leads to long-standing relationships with the graduates, encouraging long-term mentoring.

Summary Statement

Mentoring of teachers during the induction period is not systematic; most components of the mentoring depend upon relationships developed during the pre-service period and are very informal. A minimum GPA for Noyce Scholarships would help to insure that high quality students are chosen. No evidence of the development of new infrastructure to further support math and science teaching candidates from underrepresented groups.

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Proposal Number: 0531978
Performing Organization: Hope College
NSF Program: Robert Noyce Scholarship Program
Principal Investigator: Dershem, Herbert L
Proposal Title: Hope College Robert Noyce Scholarship Program
Rating: Very Good

REVIEW:

What is the intellectual merit of the proposed activity?

One of the strengths of this proposal is situating the Noyce Scholarships for teacher preparation within such a rich tradition of scientific research. The possibilities for undergraduate research at Hope College are very impressive. A teacher in the public high schools would bring many strengths if he or she engaged in this type of research throughout the undergraduate teacher preparation program.

What are the broader impacts of the proposed activity?

The role of direct engagement in scientific research in the preparation of teachers will be of great interest for other institutions. The prior involvement of faculty with other externally funded projects demonstrates an excellent tradition of managing projects and funding. The given statistics certainly support the claim for a research-rich environment.

Summary Statement

The outreach to the school districts in such things as the mentoring of students in the last two years of high school is impressive, and quite a commitment on the part of the faculty and staff. The research emphasis is well documented. The challenge will be to meld that enthusiasm with bench research with pedagogical skills that enable the new teacher to teach with all students. How this will happen is probably part of your plan, but was not that clear in the limits of the proposal. Unfortunately, we all know excellent researchers who are not gifted teachers. The field of teacher preparation will benefit from your documented success in this program if you can merge solid research with enthusiastic teaching.

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Proposal Number: 0531978
Performing Organization: Hope College
NSF Program: Robert Noyce Scholarship Program
Principal Investigator: Dershem, Herbert L
Proposal Title: Hope College Robert Noyce Scholarship Program
Rating: Fair

REVIEW:

What is the intellectual merit of the proposed activity?

Not clearly articulated.

What are the broader impacts of the proposed activity?

Adding 15 new teachers to the national applicant pool will help reduce the out-of-field teaching in mathematics and science.

Summary Statement

What will the applicant do to reduce the number of teachers leaving the profession during the first few years of teaching? A clear description on how the goals will be achieved is not given. On page 4 several projects/partnerships are mentioned, how will they be aligned with the Noyce Scholarship Program? A complete and explicit evaluation plan is not specified. What criteria will be used to match the candidates with a faculty mentor?

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Organization: Hope College

Review #6

Proposal Number: 0531978
Performing Organization: Hope College
NSF Program: Robert Noyce Scholarship Program
Principal Investigator: Dershem, Herbert L
Proposal Title: Hope College Robert Noyce Scholarship Program
Rating: Good

REVIEW:

What is the intellectual merit of the proposed activity?

This proposal builds on a strong institutional commitment to science education and proposes to integrate several existing activities (Hope College Summer Science Camp, etc.) to effectively recruit and retain future STEM teachers

What are the broader impacts of the proposed activity?

The increase of 15 new STEM teachers.

Summary Statement

This is an adequate proposal. There are a number of questions left after reading the proposal. (1) Math seems to be an afterthoughts, (2) There is no evidence of support (no letter) from area school districts, (3) There is little to show how they will be successful in recruiting/retaining students from underrepresented groups, (4) there is little research basis to their approach. There is a strong evaluation plan.

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