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PI/PD Name: Joanne E Goodell

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:

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PI/PD Name: Debbie K Jackson

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:
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PI/PD Name: Miron Kaufman

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:
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PI/PD Name: Gregory Lupton

Gender: Male Female
Ethnicity: (Choose one response) Hispanic or Latino Not Hispanic or Latino

Race:
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List of Suggested Reviewers or Reviewers Not To Include (optional)

SUGGESTED REVIEWERS:

Not Listed

REVIEWERS NOT TO INCLUDE:

Not Listed

CERTIFICATION PAGE

Certification for Authorized Organizational Representative or Individual Applicant:

By signing and submitting this proposal, the Authorized Organizational Representative or Individual Applicant 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), nondiscrimination, and flood hazard insurance (when applicable) as set forth in the NSF Proposal & Award Policies & Procedures Guide, Part I: the Grant Proposal Guide (GPG) (NSF 09-1). 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).

Conflict of Interest Certification

In addition, if the applicant institution employs more than fifty persons, by electronically signing the NSF Proposal Cover Sheet, the Authorized Organizational Representative 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 the NSF Proposal & Award Policies & Procedures Guide, Part II, Award & Administration Guide (AAG) Chapter IV.A; 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 Exhibit II-3 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 Exhibit II-4 of the Grant Proposal Guide.

Certification Regarding Lobbying

The following 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.

Certification Regarding Nondiscrimination

By electronically signing the NSF Proposal Cover Sheet, the Authorized Organizational Representative is providing the Certification Regarding Nondiscrimination contained in Exhibit II-6 of the Grant Proposal Guide.

Certification Regarding Flood Hazard Insurance

Two sections of the National Flood Insurance Act of 1968 (42 USC §4012a and §4106) bar Federal agencies from giving financial assistance for acquisition or construction purposes in any area identified by the Federal Emergency Management Agency (FEMA) as having special flood hazards unless the:

- (1) community in which that area is located participates in the national flood insurance program; and
- (2) building (and any related equipment) is covered by adequate flood insurance.

By electronically signing the NSF Proposal Cover Sheet, the Authorized Organizational Representative or Individual Applicant located in FEMA-designated special flood hazard areas is certifying that adequate flood insurance has been or will be obtained in the following situations:

- (1) for NSF grants for the construction of a building or facility, regardless of the dollar amount of the grant; and
- (2) for other NSF Grants when more than \$25,000 has been budgeted in the proposal for repair, alteration or improvement (construction) of a building or facility.

AUTHORIZED ORGANIZATIONAL REPRESENTATIVE		SIGNATURE	DATE
NAME Craig M Zullig		Electronic Signature	Mar 10 2009 4:37PM
TELEPHONE NUMBER 216-687-3675	ELECTRONIC MAIL ADDRESS c.zullig@csuohio.edu	FAX NUMBER 216-687-9382	

* EAGER - EARly-concept Grants for Exploratory Research

** RAPID - Grants for Rapid Response Research

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: **Noyce Teacher Scholarships**
2. Name of **Principal Investigator/Project Director** (as shown on the Cover Sheet):
Goodell, Joanne
3. Name of submitting **Institution** (as shown on Cover Sheet):
Cleveland State University
4. **Other Institutions** involved in the project's operation:
National Mathematics and Science Initiative
Cleveland Metropolitan School District
UTeach Institute
Ohio STEM Learning Network

Project Data:

- A. Major Discipline Code: **99**
- B. Academic Focus Level of Project: **BO**
- C. Highest Degree Code: **D**
- D. Category Code: **--**
- E. Business/Industry Participation Code: **NA**
- F. Audience Code: **WMT** _ _ _ _ _
- G. Institution Code: **PUBL** _ _ _ _ _
- H. Strategic Area Code: _ _ _ _ _
- I. Project Features: **4** _ _ _ _ _

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

- J. Undergraduate Students: **145**
- K. Pre-college Students: **0**
- L. College Faculty: **0**
- M. Pre-college Teachers: **0**
- N. Graduate Students: **0**

Project Summary

Cleveland State University seeks to transform its STEM teacher education program by annually selecting ten talented junior and senior STEM majors as Noyce Scholars and educating them for urban STEM classrooms using the successful UTeach model of STEM teacher education. Features include:

- Developing a compact four year degree program that includes both a content degree and licensure
- Melding education coursework with science, engineering, mathematics, and technology content
- Working with highly skilled STEM master and mentor teachers
- Preparing students to effectively bring STEM content to classrooms in high-need schools

In addition to the juniors and seniors, the Noyce program will build a recruitment pipeline starting in the summer prior to the freshman year through the use of six week paid internships in STEM laboratories, summer camps, and summer school as well as through free, one-credit courses that introduce students to the joys and frustrations of the classroom experience. As students move through this pipeline successfully and choose STEM majors, they will become eligible for the Noyce Scholarship in their junior and senior year.

These proposed efforts will be supported through a strong partnership between Cleveland State University, the National Math and Science Initiative, the UTeach Institute, the Ohio STEM Learning Network, and the Cleveland Metropolitan School District. A critical piece of this partnership is disseminating the Noyce successes as obtained from the UTeach model throughout Ohio, particularly to other STEM high schools and universities seeking to alter their teacher education programs. This will be achieved in the latter years of the grant through program visits, but also short-term placements (i.e. one week or less) of Noyce Scholars in OSLN STEM platform schools throughout the state.

By the end of the five year grant, we hope to have 25 Noyce Scholars and 15 highly talented, highly competent STEM teachers in urban, STEM high schools, with another 120 students (through internships or a free one-credit classes) in the pipeline pursuing a STEM content degree and teaching license.

Intellectual Merit: The proposed Noyce program is embedded within a nationally-recognized model of STEM teacher education called the UTeach model (NAS, 2005), with a significant amount of research conducted around the model (see attached UTeach reference list). This new model for teacher preparation falls outside the traditional college of education, yet retains the important features of the educational field to ensure classroom success. In addition, a strong component of this program is the ability of Cleveland State to push the UTeach model a step forward with its focus on preparing teachers for diverse classrooms. All courses will be infused with research-based theories for delivering content in the urban classroom, including culturally relevant pedagogy and assisting students with exceptionalities.

Broader Impact: The impact of this project goes beyond the Noyce Scholars and Interns supported through this effort. This funding will provide the impetus for Cleveland State to completely redesign its STEM undergraduate teacher education program, aligning it to the UTeach model. Not only will this impact the Noyce students, but it is expected to increase the overall numbers of students pursuing STEM teacher degrees, with those additional students supported financially through state of Ohio scholarships and the TEACH scholarships. Moreover, Cleveland State will be the first institution in Ohio implementing the UTeach model. As the model is implemented, the Chancellor of the University System of Ohio has indicated his interest in expanding the model to other institutions in the state (see letter in Supplementary Documentation). Changing the very nature of teacher education in Ohio will forever alter the landscape of STEM teacher education in the state.

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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)	15	_____
References Cited	2	_____
Biographical Sketches (Not to exceed 2 pages each)	25	_____
Budget (Plus up to 3 pages of budget justification)	9	_____
Current and Pending Support	9	_____
Facilities, Equipment and Other Resources	1	_____
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.

CSUTeach: Preparing a New Generation of Noyce Scholars

Results from Prior NSF Support: Three faculty members associated with this project have current NSF funding in the STEM education arena. Dr. Joanne Goodell (PI, Mathematics Teacher Education), is a partner on the NSF Cleveland Mathematics and Science Partnership grant (award number 0227082) with the Cleveland Metropolitan School District. The primary focus of the Cleveland MSP is the longitudinal investigation of the impact of content-based coursework for teachers on student achievement with a secondary focus on instructional practice at the middle and high school levels. Middle school MSP teachers from the CMSD took 24-33 semester hours of content specific graduate level coursework at CSU or JCU and high school MSP teachers completed three years of laboratory-based coursework at Case Western Reserve. Analysis of data from the Cleveland MSP indicate that although teachers have demonstrated increased disciplinary content knowledge as a result of their participation in the program, that content knowledge has not translated into student achievement in all cases. Observations and anecdotal evidence suggest that classroom instructional practices have not changed significantly and may be the barrier that is limiting impact on student achievement. This conclusion is supported by results from the mentor teachers where their students showed significant gains while the teachers were actively engaged in examining their pedagogy, but no significant gains when the pedagogical discussions ended. Although some of the results from the mentor teachers were encouraging, they suggest we need to focus our work on pedagogy and to think more deeply about the connection between teacher content knowledge and pedagogy. In addition, the data suggests students had higher achievement when participating in challenging curricula which was possible only because the teachers received this further content knowledge.

Dr. Barbara Margolius (Senior Personnel, Mathematics) serves as the PI on an NSF grant entitled “Scholars in STEM” (award number 0728625). The aim of the grant is to increase the number of students selecting STEM majors, starting with the early years of undergraduate education. The grant supports a dozen students in each cohort, with a new cohort added each year over a five year period. Students meet every two weeks to hear speakers, socialize, study, and work on joint projects. Students this Spring are preparing scientific posters related to one of their courses or a topic addressed by one of the speakers. Three students are preparing a poster related to the mathematics involved in planning a trip to Mars (i.e. what should be the flight path, when should the rocket be launched, etc). Two other students are working jointly on a poster related to their research at the Cleveland Clinic. Another group of students are presenting on the pharmacological effects of the drug Adderall. Most of the students in the program are engaged in co-curricular work or internships. As the program is only in its first year, it is too early to write about results, although most students are presently doing well.

Finally, Dr. Nigamanth Sridhar (Senior Personnel, Engineering), has recently been awarded a 2008 CAREER grant (CNS-0746632) for the project titled “Improving the Productivity of the Sensor Network Programmer.” This project is currently focused on producing usable software tools, methods, and artifacts for building sensor network systems. In particular, the project is aimed at building tools and methods that are readily usable by researchers and scientists outside of the field of computing, and is investigating ways of making this “jump” such that sensor network applications that will aid in research and science can be programmed by specialists in the field, without the need for outsourcing such work. As part of the award, Dr. Sridhar received an REU supplement that supports five undergraduate students on the project. He has also been able to extend his work into the K-12 arena, opening his laboratory for both high school students and teachers as a means to further the understanding of engineering across the pipeline.

Description of Proposed Scholarship or Stipend Program: Undergraduate students attending Cleveland State University with an interest in STEM teaching will have the opportunity, through the Noyce Scholars Program, to participate in a nationally innovative STEM teacher education curriculum called UTeach, a curriculum that has been wildly successful in Texas (NAS, 2005). With the support of the NSF Noyce Scholars Program, Cleveland State will bring the UTeach model to Ohio, completely

transforming the Cleveland State teacher education experience for pre-service teachers who will be licensed to teach grades 7-12, with an emphasis on preparing for underserved, urban classrooms. The Noyce Scholars will be eligible to become licensed STEM teachers when they complete this model program. Features of the Noyce experience in the proposed CSUTeach program include:

- **Participating in a compact four year degree program that includes both a content degree and licensure.** The current CSU licensure program takes the average student six years to complete. The four year degree program is much more attractive to students and will result in not only a license to teach grades 7-12 but also a degree in either mathematics or an area of science or engineering.
- **Learning about the classroom early through paid summer internships and free courses.** Traditionally, many of the teacher education programs in Ohio wait until the latter years of program completion before sending pre-service teachers into the classroom. By offering freshmen and sophomores a taste of teaching mathematics and science as early as the first semester of their studies as well as through six week summer internships in STEM research laboratories, classrooms, and summer camps, we are providing an opportunity for students to identify early their inclinations toward teaching science or mathematics.
- **Understanding STEM teaching through the integration of education coursework with science, engineering, mathematics, and technology.** Today the students who enroll in the teacher education program in mathematics or science take most of their education-focused coursework alongside teachers-in-training for other disciplines. The UTeach program separates those students who are interested in teaching mathematics or science and provides the STEM context for each pedagogy course.
- **Working with highly skilled STEM master and mentor teachers in STEM-focused urban high schools.** A critical component of the Noyce Scholar's experience with CSUTeach is the opportunity to be placed with the best and brightest teachers who are employed in specialty STEM high school classrooms within Cleveland Metropolitan School District, an urban system. Ohio is currently implementing STEM platform schools throughout the state and is staffing these high schools with the best of the best. It is within this environment that Noyce Scholars will learn the day-to-day expectations for strong STEM teaching and learning.

As Cleveland State University works with its partners (National Math and Science Initiative, UTeach Institute, Ohio STEM Learning Network, and the Cleveland Metropolitan School District) to implement the UTeach model for the Noyce scholarship and stipend recipients, the following outcomes are expected:

Outcome 1: Each year, ten juniors and seniors will be offered two year, \$10,000 scholarships (\$5,000 each semester for four semesters) as well as classroom teaching tools (laptop computers, graphing calculators, etc.) to participate in the CSUTeach program. This number reflects the need for full scholarship support for students attending CSU (over 70% of the population is Pell eligible) as well as an increase of 22% in the current number of STEM undergraduate teacher education candidates (45 students are currently enrolled in STEM teacher education).

Outcome 2: Each year, five freshmen or sophomores will receive \$450 a week for six weeks over the summer to participate in research as laboratory assistants or as teaching assistants in intro STEM courses or summer camps as a means to be introduced to the STEM teaching profession. In addition, 30 students per year (freshmen and sophomores) will participate in free, one credit courses as an introduction to the STEM classroom environment.

Outcome 3: By the end of the grant, this program will have awarded two years of full scholarship support to 25 Noyce Scholars, with 15 of these Scholars placed as highly talented, highly competent STEM teachers in urban STEM high schools. In addition, another 120 students (through internships or the free one-credit classes) will be in the pipeline pursuing a STEM content degree and teaching license. This will begin a significant change in the number of undergraduate STEM teacher education graduates

completing their program of study at CSU, which now stands at approximately 5-8 per year (the post-bac STEM teacher education program is the primary draw at the University). The low numbers in the undergraduate program are attributed to the current length of the program, which takes a minimum of six years to complete. By bringing the UTeach model to Cleveland State, we hope to significantly change the culture and time-to-degree for future teachers.

Outcome 4: Each year, the partners will work together to monitor the effectiveness of this new teacher education model in Ohio and disseminate its successes to other institutions of higher education around the state through program visitations and assistance from the Ohio Board of Regents and the Ohio Department of Education to integrate UTeach components into existing licensure requirements.

Description of the Teacher Preparation Program: The partners in this grant will seek to replicate the UTeach model at Cleveland State, calling it CSUTeach, thereby offering Noyce Scholars and Internship recipients a new experience in preparing for the urban STEM classroom. The UTeach model has been nationally recognized for its success in increasing the number of highly qualified STEM teachers (NAS, 2005). When the model began in 1997, 25 students were enrolled in the UTeach program; today, over 450 students are enrolled in UTeach. Moreover, the program has doubled its number of secondary math and science teachers, from 30 graduates a year to over 70 per year. In addition, the average GPA for these students is between a 3.0 and 3.49. Cleveland State wants to replicate this success (UTeach, 2007).

In short, Noyce Scholars will graduate from Cleveland State with not only a STEM content major, but also licensure and expertise to teach STEM in grades 7-12, particularly in an urban environment. Moreover, the Noyce Scholars will be able to finish their degrees in four years, without needing to take additional coursework that might extend their time-to-degree. Over the last two years, faculty from Cleveland State's College of Education and Human Services (COEHS), College of Science (COS), and College of Engineering (ENG) have been working to bring resources to CSU to address issues associated with transitioning the teacher education curriculum to the UTeach model. What follows is a review of each discipline and the changes they expect to make to meet the eight semester (four year) requirement of the UTeach program.

- **Mathematics and Science Education:** The biggest transition will occur within COEHS, where credit requirements will be reduced from 38 credits to 18-20 credits. This represents a reduction of eight courses including Wellness as a Lifestyle, Educational Technology, Teaching as a Profession, Classroom Assessment, Content Area Literacy, Teaching Students of Varying Abilities, and Diversity in Educational Settings. However, it is planned that information about technology, assessment, special needs, and diversity will be incorporated in the CSUTeach pedagogy courses as well as selected content courses. In addition, the College will be reviewing the number of hours currently required for student teaching and create a master's degree program which will include the topics that are being deleted from the current program.
- **Mathematics:** Over the last year, the Mathematics Department has been changing the way it delivers its curriculum to teachers in training. The requirements of UTeach, therefore, pave the way for easy implementation of this new four year degree, which will result in a B.A. in mathematics. We have attached in the Supplemental Documentation a copy of the near-completed draft of a four-year Mathematics program with licensure that would serve as one of the first programs ready to become identified in the CSUTeach efforts for Noyce Scholars to enter.
- **Chemistry:** There is currently a pre-med curriculum that could easily be a model for the pre-education curriculum by replacing the biology requirements with the UTeach requirements. This transition would also allow for the addition of more chemistry courses to the program.
- **Physics:** Faculty have currently developed two plans that could be completed in four years with the new UTeach education courses. The first is a single subject Physics license that would result in a B.S. in Physics that could be completed in 138 credit hours. A second degree option would result in dual

licensure in Physics and Chemistry and a B.A. in physics with 140 hours required.

- **Biology and Earth Science:** Getting to the single degree licensure in both Biology and Earth Science is easily accomplished by reducing advanced, specialized courses in favor of a broad range of second level courses in the curriculum. Also, reducing the number of education courses through replacement of the CSUTeach pedagogy courses, the four-year path is expected to be attainable.
- **All science content areas:** The state of Ohio offers an integrated science licensure which enables teachers to teach all of the sciences in grades 7-12. The current CSU program requires approximately 200 semester credit hours of study to complete this license. The team will work with the state of Ohio via our Ohio STEM Learning Network partner to expand the completion of dual licenses and to revise state policies associated with integrated licenses in order to optimize their the balance of time-to-degree, content, and hiring issues while producing high-quality, general science teachers that can succeed in the job market and in the classroom.
- **Engineering:** Because the state of Ohio does not offer licensure in the engineering field, the discipline is largely unrepresented in the current pre-service teacher curriculum. To counteract this problem, the team includes ENG faculty members who are devoted to bringing this applied mathematics and science field to the K-12 classroom. With the emphasis on Problem-Based Learning in the UTeach program, as courses are revised, significant focus will be given to bringing Engineering experiences into the program through hands-on activities.
- **Urban Focus:** A key feature of this proposal is not only preparing Noyce Scholars to be highly accomplished content teachers, but also to be successful in high need schools. As a result, the team will tap into the expertise of urban education scholars at Cleveland State who perform research on issues such as culturally relevant pedagogy. This knowledge will be woven into the UTeach curriculum.
- **Pedagogy:** Current education coursework will be streamlined from the existing 38 credits to the ones prescribed by the UTeach program. The following chart highlights the current situation and some of the possible changes that will be made during the first year of the NSF Noyce grant to accommodate the UTeach pedagogy courses and be prepared for the first class of Noyce Scholars to begin in Fall 2010 (all course development will be spearheaded by the faculty from COS, COEHS, and ENG who have participated in the planning of this proposal). During the planning year the steering committee will work to produce a faithful replication as described below. Several issues will need to be addressed including 1) preparing students to pass the Praxis II Principles of Teaching and Learning test, 2) aligning the UTeach model to the current COEHS portfolio outcomes (described in the evaluation section), and 3) incorporating topics of diversity, social foundations, and exceptionalities to ensure that the students are prepared to teach in urban settings.

UTeach Course	Current CSU Course	Changes Required
Course 1: Step I, Inquiry Approaches to Teaching	Intro to Teaching, but no field experience.	Develop a new course, eliminating the Introduction to Teaching Course for the CSUTeach students only. (All CSUTeach courses would have their own code, i.e. EUT 305). This course could be accepted as one of the general education electives.
Course 2: Step 2, Inquiry-Based Lesson Design	Currently not available	Develop new course for the CSUTeach program.
Course 3: Knowing and Learning in Mathematics/Science	EDB 302, Educational Psychology	Streamline to focus only on mathematics and science; a separate CSUTeach course.
Course 4: Classroom	EDB 305,	Would streamline this course to focus only on mathematics and

Interactions	Methods	science; taught by COEHS instructors.
Course 5: Functions and Modeling	Currently not available	A new course; the Mathematics Department is currently developing a separate track for teachers only that might incorporate a course like this. Would like to have this team-taught by COS and COEHS.
Course 6: Perspectives on Science and Mathematics	Course of same name in Philosophy	A new course developed through the Philosophy Department in conjunction with CSU Teach faculty. This course would be team-taught at least initially.
Course 7: Research Methods	Currently not available in this format	Model on the research methods course currently in COS, and link to the senior project that all science majors currently have to take.
Course 8: Project-Based Instruction	Practicum (180 hours of field exp.) and EDS 315 or 317	Will alter to focus more strongly on project-based instruction as well as mathematics and science content. This course will also tap College of Engineering faculty to participate through applied engineering laboratory activities. This course will still incorporate significant field work.
Course 9: Apprenticeship Teaching	Student teaching	Team will work with the state of Ohio to consider reducing amount of student teaching in order to accommodate the four-year requirement, as UTeach doesn't require same amount of student teaching required by Ohio.

Early Field Experiences: Cleveland Metropolitan School District (CMSD) will work with CSU faculty in the development of the early field experiences called Step I and Step II classes, helping to introduce students to a STEM teaching career. The Step I course includes an experience in a middle or high school working one-on-one with students and observing the classroom teacher as well as an introduction to teaching and an opportunity to reflect on the choice of teaching as a career. The Step II course includes an additional field experience in a middle or high school in which the pre-service teacher not only observes, but also teaches a lesson or a series of mini lessons. These two courses offer students the opportunity to determine their interest in becoming a STEM teacher early in their program. Cleveland Metropolitan School District is 100% low-income, with 70% of their students of African-American descent and 10% from Hispanic backgrounds. In addition, CMSD has three STEM platform high schools that will serve as partner schools for this program.

Freshmen and sophomores will also have the opportunity to participate in summer internships on the Cleveland State campus in one of three venues: They can participate in content research within science and engineering laboratories, as CSU offers a formalized summer undergraduate research experience each year. Last summer, over 50 students participated. A second venue is serving as teaching assistants in introductory math, chemistry, physics, and engineering courses that are offered during the summer months. Finally, Cleveland State hosts a number of summer STEM camps that cater to high school students (e.g. Energy and Engineering). Internships will be made available to have pre-service teachers participate in these camps.

Master Teachers: All Noyce Scholars as well as the freshmen and sophomore interns and Step I/II scholarship recipients will be guided by a Master Teacher. This Master Teacher would work directly with the school district in establishing the STEP I and II experiences and help coordinate placements in the later field experiences. Qualifications include a master's degree and evidence of their ability to provide high quality classroom instruction. In addition, it is expected that the Master Teacher—as the first point of contact for recruiting students—would have strong communication skills and a passion for developing the best and brightest for our classrooms. The Master Teacher would also have personal experience working in urban classrooms so that they might better prepare the CSU Teach students for their field experiences.

The Master Teachers would be asked to take full responsibility for the success of the Noyce students. We anticipate recruiting our first Master Teacher from the Cleveland Metropolitan School District during the planning year of the grant.

Mentor Teachers: Noyce Scholars working in CMSD classrooms will also be matched with mentor teachers as part of their experience. Currently, the system for matching mentor teachers with science and mathematics candidates lacks the contextual detail required to always make successful matches. Through this effort, we will work with CMSD to devise a system of strong matching and interest in the CSUTeach program, with an emphasis on STEM platform schools. We envision developing a cadre of strong STEM mentors who are trained in the CSUTeach philosophy and who are held in high esteem for their contribution to the development of the student. We also envision through the CMSD STEM high schools the development of a strong culture in both CSU and CMSD in support of CSUTeach.

Modeling Best Teaching Practices: Because of the new focus on science and mathematics pedagogy courses, all faculty and instructors associated with CSUTeach will be encouraged to and rewarded for teaching courses using multiple formats including inquiry-based teaching methods in lecture formats. Working first with our core of committed faculty, each instructor will be asked to incorporate appropriate technology in teaching including web-based applications, social networking, graphing calculators, computer based laboratories, etc. as well as inquiry-based methodology. This small team—which will become the basis for offering dedicated UTeach course sections--will also serve as advocates for disseminating best teaching practices throughout the content courses and among their colleagues.

Description of Recruitment Activities: Due to the currently low numbers of undergraduate mathematics and science education students (27 in mathematics education and 18 in science education), significant attention has been paid to a recruitment strategy for CSUTeach. A multi-layered effort will occur that targets multiple groups of potential students: high school students; College of Science majors; College of Engineering majors; undecided majors; Honors students; and community college STEM majors. We believe that with a targeted recruitment plan and an attractive program as offered via the UTeach model, we can increase the number of students interested in STEM teacher education. In fact, in a recently received grant that focused on helping current professionals become STEM teachers in one year (a post-bac program), we had over 200 very strong applicants over a two week recruiting period.

The **first step** in recruiting Noyce Scholars to this program is to create an identity for the Cleveland State University teacher education program that stands out amongst the rest. After many discussions with the planning committee, it was agreed that our program would become known as CSUTeach—a way to have it identified with both our institution as well as the national initiative. CSUTeach hopes to follow a similar path as that forged by the Honors Program in the creation of an identity that boasts of high-achieving students who are valued by staff, faculty, and administration at Cleveland State as well as by members of the external community. The primary activities that will occur in the development of the CSUTeach identity are as follows:

- The first cohort of Noyce Scholars selected to be part of CSUTeach will have their pictures included as a special advertisement in the Cleveland *Plain Dealer*, as well as through posters hanging throughout the University and within the region's school districts. In addition, we will work with our local public radio (WCPN) and TV organization (WVIZ's *ideastream*) to showcase our students.
- All external publications will highlight statistics of success at Cleveland State, thereby continuing to build the perception that studying under CSUTeach as a Noyce Scholar is a privilege and highly competitive. One part of this marketing message will be a focus on the high-caliber, nationally recognized faculty who will be involved with CSUTeach. For example, Dr. Jearl Walker from Physics has published a textbook (*Fundamentals of Physics*) that has been translated in 14 languages worldwide; Dr. John Holcomb is a Carnegie Scholar recipient from the Carnegie Foundation for the Advancement of Teaching and he has won the Waller Award for Teaching Excellence in Introductory Statistics from the American Statistical Association; and Dr. Dianne Corrigan is the recipient of the

Association of Teacher Educators (ATE) National Award for Distinguished Clinician in Teacher Education 2007.

- Part of creating an identity that attracts students is to ensure that all faculty associated with CSUTeach are positive and enthusiastic about the effort. As such, all faculty will receive special titles through their involvement in the program, will be pointed out during convocation addresses, and be invited to participate in a general orientation about the CSUTeach efforts. Moreover, to ensure continued involvement, they will be invited to annual retreats/meetings in order to help continue strengthening the program.

The **second step** in the recruitment plan during the planning phase is the development of appropriate literature and materials in November and December 2009. Tri-fold brochures, a web-site, and posters will be developed with the help of the Cleveland State marketing department, with each of these pieces carrying the same theme: *Make a difference in Ohio's future—become a science or mathematics teacher in four years*. Following that theme will be a targeted message that CSUTeach offers individuals their first two, one-hour courses free of charge so that they can explore teaching as a career. Other points to be made will be the availability of scholarship support (the Noyce Scholars), paid internships (the Noyce Stipends), and strong content-focused courses integrated with appropriate mathematics and science education courses. As the years progress, these materials will also include testimonials of successful Noyce Scholars. In addition to the literature and website, we will work with our local public television (PBS) and radio (NPR) station collaboration—*ideastream*—to develop audio and visual public service announcements about CSUTeach. We will also integrate material in the mainstream media. We will also work with the Ohio STEM Learning Network as a statewide communication network.

After the core message and medium have been developed, the **third step** will be to take the message to specific groups of potential students with specific activities, starting in January 2010. These include the following:

1. High School Students: In addition to one-on-one contact by CSUTeach faculty becoming involved the area schools as well as presenting to school students and providing professional development, there are specific programs in place that allow us to reach additional students:

- **Ohio Board of Regents Summer Academies:** The State of Ohio sponsored 10 summer mathematics and science academies for junior and senior students throughout the state for the first time in the summer of 2007 and is continuing this program each summer (one is being offered this summer at Cleveland State). All students participating in these academies will receive information about the CSUTeach and Noyce Scholars programs.
- **Cleveland Metropolitan School District students:** The University has partnered with the Cleveland schools to offer mathematics and science course work to high school juniors and seniors during the summers. These students will be better prepared for math, science, and engineering curricula when they enter college and thus targets for recruitment. In addition, we will work specifically to reach individual students through the specialized STEM schools that are currently being developed by CMSD as well as through various student/teacher presentations.
- **Post-Secondary Enrollment Option Program (PSEOP):** This program offers high school students the opportunity to take college-level courses for dual high school and college credit. Many high school students throughout Ohio take advantage of this state-sponsored program to enroll in college courses concurrent with their high school program.
- **Calculus for Free:** This four credit hour course is offered over the summer to students who commit to attend Cleveland State in the Fall on a full-time basis of 15 credits. The University picks up all costs, but if the student does not enroll full-time, they are billed for the course. Students participating in this class will also be targets for CSUTeach and Noyce.

- **Summer Scholars:** This summer program offers six weeks of intensive academic instruction and cultural enrichment activities for high school juniors and seniors capable of handling a high school honors curriculum, but not fully academically prepared to enter the University’s Honors Program. Led by Cleveland State faculty, the program eases the transition from honors-level high school work to honors-level college work and increases the number of students from Cleveland and targeted urban high schools who enter and excel in the University’s Honors Program. Top performing students are admitted to the Honors Program. For those Summer Scholars who show an interest and promise in STEM, appropriate advising will be offered which will include an introduction to CSU Teach.
- **FIRST and VEX Robotics Competitions:** Another recruitment option is through the FIRST Robotics competition (also held on the CSU campus), which draws over 32,000 students nationwide each year. This year CSU also organized its first VEX Robotics competition
- **Cleveland Engineering Society Road Show:** The Cleveland Engineering Society will be informed of the CSU Teach efforts and during their high school road shows (they visit an average of 31 high schools per year, making contact with over 1,400 high school students), will include this in their presentations.
- **Fenn Academy:** Working in collaboration with more than 28 high schools in the northeast Ohio region, Cleveland State’s Fenn Academy offers educational activities that stimulate and encourage 9th-12th grade students to pursue careers in engineering and technology, providing technical, and when possible, financial support to those students as well as their classroom teachers. This is accomplished through Engineering Activity Days, “Engineer For A Day” Job Shadowing Program, and pre-engineering course development. In addition, through partnerships with a wide variety of corporate entities, students who select to attend Cleveland State may also be eligible for scholarship support. If this grant is funded, this information will be included in the Academy’s marketing materials.

2. First Year STEM Students: The state of Ohio has invested heavily in STEM education, recently through their scholarship efforts via the Choose Ohio First Scholarship Program. Cleveland State is a participant in four of these programs. One focuses on bridging the gap between the high school and university in mathematics preparedness (Success in Mathematics); another targets STEM teacher education (Improving STEM Teacher Preparation: A Long Term Investment,); the third is developing a culture of science entrepreneurship and an understanding of bioscience across the educational pipeline (Science Entrepreneurship in the Biosciences); and the final program emphasizes outreach activities associated with nursing. These scholarships can be tapped for the freshmen and sophomores who are excited by the Step courses or the summer internships, thus allowing them to move along toward the junior and senior years to become Noyce Scholars.

3. Honors Students: The Honors Program serves as a fantastic vehicle for recruitment, particularly since 39% of participating students major in mathematics, science, or engineering. Each January, the Honors Program hosts an introduction to parents and students about enrolling at Cleveland State. Last year, over 300 parents and teachers attended. This annual event is an ideal outlet for advertising about CSU Teach and the Noyce Program. In addition, these students will be individually courted to join CSU Teach. Step I/II courses will also be offered as honors seminars in which students are required to participate.

4. Community College STEM Majors: As with the high school population, faculty will travel to the three regional community colleges to alert faculty and students of the existence of CSU Teach. Community college students are also part of the “Calculus for Free” course, another method for reaching this population.

5. Current COS and Engineering Majors: The proposal preparation committee has committed to attending at least five high volume lecture courses to inspire current COS and Engineering students to consider the CSU Teach experience and become Noyce Scholars. Emphasis will be placed on the four year

route as well as the possibility of *not* selecting teaching after the four years, but being able to matriculate to graduate school or another STEM career.

Description of Selection Process: Each year of the grant, the Noyce Scholars and summer interns will be selected through a highly competitive process. Applicants will need to be admitted to the University and/or in good academic standing to be eligible to apply. To select the Scholars and Interns, a three-tiered system will be implemented, including a written application and a performance-based interview. In *Stage One*, applications will be made available to the interested students through a web-site and paper methods where they will be asked to complete the application, submit two letters of reference, and their high school and/or college transcripts. The application forms will be slightly different for the scholars versus the internships.

In *Stage Two*, as applications are received, each member of the Steering Committee will rate the application packets according to experience with high school and/or middle school students; extracurricular activities; interest in the project; rating of recommendation letters; and Science/Math background. After a review and ranking of the written applications by the steering committee, top candidates will be invited for a performance-based interview, which will include teaching a sample lesson to a group, participating in an activity designed to assess their ability to work collaboratively, and answering traditional interview questions.

In *Stage Three*, the Steering Committee will review the final candidates and make a determination of financial need, representation of minority populations, and fit into the program.

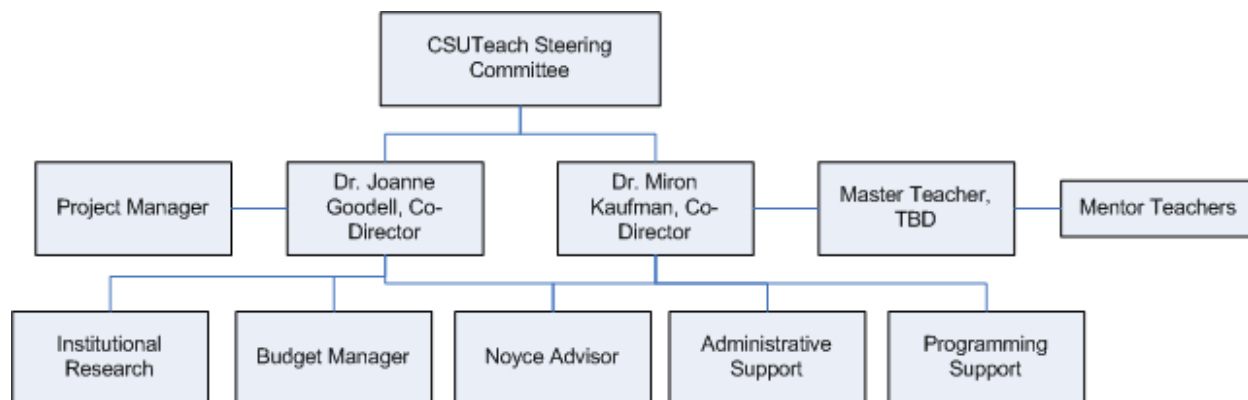
Description of Management and Administrative Structure: Fortunately, Cleveland State has a strong culture of collaboration both internally and externally. Representing this multi-faceted collaborative effort will be a group of individuals serving on a **Steering Committee** (chaired by Co-Directors Dr. Joanne Goodell from the Teacher Education Department and Dr. Miron Kaufman from Physics) that will meet monthly during the planning period, and quarterly thereafter. The purpose of the committee will be to ensure joint decision making and troubleshooting for all aspects of CSU Teach and the Noyce Scholars, from student affairs issues to curriculum topics. The committee will initially be heavily weighted toward the university community due to the initial work needed in the new course pathways. In latter years, the formulation of the committee members will be reviewed based on the needs of the program. The following individuals have agreed to initially serve on this committee: Ulrich Zurcher, Assistant Professor of Physics; Greg Lupton, Professor of Mathematics; Michael Walton, Professor of Biology; David Ball, Professor of Chemistry; Debbie Jackson, Assistant Professor of Science Education; Richard Hurwitz, Associate Dean of Academic Programs, College of Education and Human Services; Steve Duffy, Professor of Civil Engineering; Nigamanth Sridhar, Associate Professor of Electrical and Computer Engineering; Sonya Prior-Jones, Executive Director of MC2STEM Hub and OSLN Representative; and Eric Gordon, Chief Academic Officer of the Cleveland Metropolitan School District. In addition, a CSU student representative, a member from the business community, and a member of either the Ohio Department of Education or the Ohio Board of Regents will be asked to join the committee.

Another very important component of the management of this project is the direct involvement and consultation that will be received from staff at the UTeach Institute and NMSI. As partners, they will provide direction, guidance, and support to assist the University in fully and faithfully replicating the UTeach model. This includes assisting in curriculum development as well as teacher and faculty training. This involvement ensures faithful replication of the UTeach model as well as a resource to deal with implementation issues for the program. The UTeach Institute is currently working with institutions across the country with their implementation of the model.

Two individuals have been appointed to serve as the leadership and co-directors of CSU Teach: Dr. Joanne Goodell from Education and Dr. Miron Kaufman from Science, with support from a cadre of faculty from all of the disciplines (listed as Co-Pi's on this proposal). These two individuals were selected

based on their enthusiasm for change, their administration experience, and their respective research fields (mathematics education and physics), as indicated by their attached CV's.

As identified in the following organizational chart, the staffing and management of CSUTeach and the Noyce effort mirrors the UTeach initiative, yet takes into account the culture and environment of Cleveland State University. Following this staffing chart are the detailed descriptions of the faculty involved in the CSUTeach courses along with their personal statements. In the budget for the Noyce Program, please note that significant cost share is provided from both NMSI as well as Cleveland State in order to develop a full teacher education program that will serve students beyond the Noyce cohort and thus extend the life and permanence of this effort.



Administrative Staffing: A Project Manager with nearly 15 years of experience managing STEM-related grants and initiatives will lead administrative efforts in support of CSUTeach in general and the Noyce Program specifically, from managing schedules and evaluation activities to organizing the marketing and outreach efforts. The position will be supported by two graduate assistants (one for administrative & evaluation tasks and one for programming tasks). In addition, a budget manager as well as institutional research staff will be available to handle all budget transactions and macro-level data collection.

Master Teacher: While not yet hired, this individual will possess a master's degree and has at least 10 years of experience in the classroom. The 10 years of experience must be marked with nationally-recognized qualities of a strong teacher. The individual will also have administrative experience and some experience working within a University setting. This individual will have direct responsibility for providing a support structure for students, supervising field experiences, acting as a university and community connection, providing programmatic support, and serving on CSUTeach sub-committees. The first Master Teacher will be hired during the planning year.

Mentor Teachers: These individuals will be selected based on their commitment to the CSUTeach philosophy and, as described earlier, through evidence of expertise in STEM. These individuals will work with the Noyce Scholars in their field experiences.

Advisor: One individual will serve in advising capacity for the Noyce Scholars. They will be re-assigned from their current tasks to focus specifically on CSUTeach and Noyce, helping students manage schedules, oversee their e-portfolio development, and serve as advocates for the students.

Infrastructure Supportive of New Teachers: Providing support for the Noyce Scholars in the early years of their careers is critical, particularly since they will be placed in an urban district. As a result, a number of support options (some currently in place and some new to Cleveland State) will be established:

- All teachers in Ohio must have a Master's Degree when applying for the third renewal of their 5-year license (approximately 11 years). Because of this requirement, the Noyce Advisor will be tasked with helping our first year graduates prepare a plan to continue their coursework at the Master's level.

Courses that will be recommended include those dealing with urban classrooms, advanced assessment, and exceptionalities among students including English as a Second Language, special education, and gifted students. The faculty in the COEHS have begun to discuss how the courses that will be eliminated from the CSUTeach program could be offered at the graduate level to create a master's degree program for these students.

- The Master Teacher will be required to make on-site visits at least once per semester to provide any help or support for the new teachers where geographically possible. Master teachers will also communicate with all graduates of the program through online social networking platforms.
- The CSUTeach and Noyce graduates will be encouraged to participate in occasional Saturday programs as offered by the First Ring Leadership Academy and other regional STEM organizations. For example, the new Ohio STEM Center (as supported by the State Governors Association) will offer a wide range of professional development opportunities, of which the Noyce graduates will be highly encouraged to attend. Over the past 10 years CSU has offered numerous professional development programs for mathematics and science teachers; CSU will continue these efforts and invite CSUTeach graduates to attend.
- An on-line community will be part of the CSUTeach website, with a special section reserved for the practicing teachers. As part of this community, issues associated with urban classrooms will be discussed and emphasized, with ideas for solving problems offered.

Collaboration Between STEM and Education Faculty: As the College of Science and the College of Education and Human Services move their collaboration to the next level through CSUTeach and the joint development of the four year content and licensure plans, the team will also reach out to strengthen its relationships with other colleges on campus. Within the College of Engineering, two engineering faculty members (Dr. Stephen Duffy and Dr. Nigamanth Sridhar) have been asked to serve on the Steering Committee to help increase teacher understanding of the role of engineering within the mathematics and science curriculum. In addition, we will work with Engineering to help identify summer internship opportunities within the laboratories of faculty. For example, the CSUTeach students could work for a semester or over the summer as an assistant in the CSU Driving Simulation Lab, the Dependable Systems and Networks Lab, or the Space Systems Lab. The presence of engineering in the CSUTeach program will be further increased by tapping an Engineering faculty member to co-teach the Project Based Learning course.

The following chart outlines the involvement of STEM faculty in this effort and shows significant commitment toward the proposed model and Noyce Scholars program.

Table 1: Contributors to Proposal Development		
Name/Department	Contribution to Development	Expected Contribution to CSUTeach and Noyce
College of Science Faculty and Administration		
Bette Bonder, Dean, College of Science	Reviewed space and budget; faculty time; and outreach ideas	Budgetary, space, and personnel decisions on behalf of the College of Science will be made by Dean Bonder
David Ball, Professor, Department of Chemistry	Provided feedback on proposal as well as reviewed current chemistry content programs to determine make up of four-year program	Leader of team that will develop various four-year tracks within the Chemistry Department
Michael Walton, Associate Professor, Department of Biology	Provided feedback on proposal as well as began review of current biology programs to determine what changes will need to be made	Leader of team that will develop various four-year tracks within the Department of Biological, Geological, and Environmental Sciences

Petru Fodor, Assistant Professor, Department of Physics	Offered ideas for improving the content of the physics courses targeting teacher candidates, such as integrating the laboratory and lecture courses more fully	Faculty member who will serve on team to alter courses to fit within a four-year time frame; will teach Physics Research Methods courses for CSUTeach students
Miron Kaufman, Chairperson and Professor, Department of Physics	Provided support for changes within the Physics Department; ideas on recruiting teachers to CSUTeach; ideas on curriculum enhancements and research methods for CSUTeach; developed various draft four-year plans	Co-Director of the CSUTeach representing the College of Science; will assist in overseeing entire effort and implementing required changes in the development of the CSUTeach structure
Greg Lupton, Chairperson and Professor, Department of Mathematics	Spearheaded sub-group of all discipline chairs to determine alterations for the CSUTeach four year plans	Leader of Mathematics team that will alter programs to fit four-year timeframe as well as leader in ensuring fidelity of CSUTeach implementation
Barbara Margolius, Professor, Department of Mathematics	Discussed possibilities for streamlining coursework for teacher education candidates in mathematics and strategies for recruiting students as math majors seeking to be teachers	Will serve on team to alter courses and program to fit within a four-year time frame; will serve as point-person for the Mathematics Department for recruitment of students to CSUTeach
Ulrich Zurcher, Assistant Professor, Department of Physics	Offered ideas on current needs of physics students and how best to recruit into the program	Will serve on team to alter courses and program to fit within a four-year time frame
College of Education and Human Services Faculty and Administration		
Jay McLoughlin, Dean, College of Education and Human Services	Reviewed coursework and faculty issues	Will make budgetary, space, organizational, and personnel decisions on behalf of the COEHS
Rob Ferguson, Associate Professor, Science Education, Department of Teacher Education	Offered direction for involvement of students in outreach and research efforts	Will teach Project-Based Instruction or Apprentice Teaching courses for CSUTeach students
Joanne Goodell, Associate Professor, Mathematics Education, Department of Teacher Education	Lead organizer of team to change the way Cleveland State prepares mathematics and science teachers; collected required data; began discussions with University leaders; and offered insight and ideas on how to make the CSUTeach changes	Co-Director of CSUTeach representing the College of Education and Human Services; will alter program to meet CSUTeach requirements; teach the appropriate pedagogy courses; and oversee entire effort
Debbie Jackson, Assistant Professor, Science Education, Department of Teacher Education	Spearheaded efforts to determine education courses that will be replaced by the CSUTeach courses as well as ways to further involve the Engineering faculty in the effort	Will serve on team to alter courses to fit within a four-year time frame (as a Co-PI); teach Project-Based Instruction or Apprentice Teaching or Knowing and Learning courses
Fenn College of Engineering		
Stephen Duffy, Professor, University	Offered ideas on how to integrate CSUTeach students into applied	Will serve as Engineering College liaison on the planning team to identify

Transportation Center and Civil Engineering Department	projects, such as driving simulation projects in work zones; also discussed matching engineering students with CSUTeach students on projects	appropriate internship and applied engineering opportunities for CSUTeach students
Nigamant Sridhar, Associate Professor, Electrical and Computer Engineering	Worked on EESC 2008 and will work on EESC 2009; organized VEX Robotics competition; led undergraduate research in summer 08, and will repeat in summer 09.	Liaison for lab research experiences for Noyce Scholars in Engineering; work with K-12 teachers.

Evidence of Functioning Partnerships Between IHE and School Districts: Cleveland State enjoys a very special relationship with its urban neighbor, the Cleveland Metropolitan School District (CMSD). Through this relationship, CSUTeach will work closely with administrators to ensure that all new course structures as well as activities developed will have a direct connection to preparing teachers to serve in an urban environment. Having an urban approach in the CSUTeach effort is critical if we are to develop successful mathematics and science teachers able to be retained in the classroom. Fortunately, this conversation will be natural, as many of our education projects at Cleveland State have indeed been influenced by the needs of CMSD. A small example of the multitude of current partnerships include:

- **Development of STEM Platform High Schools:** CMSD has recently developed two STEM platform high schools, the STEM High School and Design Lab. In each effort, the faculty listed in this proposal has been intimately connected to the high school development through curriculum design, outreach efforts, and professional development. In addition, CSU is partnering with CMSD to develop a pre-med pipeline program focused on preparing urban physicians. These schools will be the first laboratories and sites for the Noyce Scholars, which will further extend our work with these cutting-edge schools.
- **Teacher Pipeline to CMSD:** Cleveland State is the primary provider of teachers to the CMSD. We typically place approximately 240 pre-service teachers in the CMSD each year across all programs (early childhood, special ed, middle and secondary).
- **Professional Development for Teachers:** Through an Ohio-funded content professional development program, Cleveland State has offered inquiry-based content material to over 200 CMSD teachers. In addition, through the NSF's Cleveland MSP effort, over 120 middle school teachers received content-related training.

Plans to Monitor and Enforce Compliance with the Required Teaching Commitment: CSU has had experience with providing teachers with full scholarships to teachers to improve their teaching credentials and enforcing their commitment to remain teaching in CMSD in a program known as The Urban Fellows. Promisory notes will be drawn up by the CSU Legal department, and each Noyce scholar will have to sign the note upon entry into the program, and sign updated notes each semester until program completion. Recipients will then be required to submit notarized evidence of their continued employment in a recognized teaching position for the life of the commitment. Because it is possible to query the state education agency data to determine in which school district a teacher is employed, every effort will be made to track the Noyce scholars to ensure the enforcement of their commitment. If anyone reneges on their commitment, appropriate legal action will be taken.

Evidence of Central Institutional Focus: The entire Cleveland State community is ready to jump into the national arena of math and science education. President Michael Schwartz has provided his full support for CSUTeach and the role of Noyce Scholars within this program. In fact, he has said that:

Cleveland State University is of critical importance to the economic and intellectual future of Northeast Ohio, and part of that importance is being able to graduate the best and the brightest in the fields of

science, technology, engineering, and mathematics (STEM). Our University has committed significant resources toward this goal, from opening a new College of Science in 2004, hiring additional faculty in mathematics and science, and leveraging the significant resources of community organizations such as the Cleveland Clinic Foundation and NASA Glenn Research Center as research and training grounds for our students. In recognition of this growth and focus, the University has become quite successful in securing external funding in STEM. While the list of support is too long to include here, highlights include the U.S Department of Education's Graduate Assistance in Areas of National Need support in two different disciplines, molecular biology and clinical chemistry; the National Science Foundation's expected scholarship support of the University Scholars in STEM program; and the Ohio Board of Regent's support of our summer engineering academy for high school students and STEM professional development programs for the region's teachers. Bringing the UTeach Initiative to Ohio through the work of faculty at Cleveland State provides an opportunity to offer a complete array of excellence in our support of STEM students and thus brighten the future of our region and state. It is imperative to change the way we recruit and train future STEM teachers in Ohio; UTeach provides us with the resources and support needed to accomplish such an important task.

In addition, the support continues throughout the upper administration. Provost Mary Jane Saunders has pledged her support of over \$120,000 for CSUteach and the Noyce Scholars effort. This includes payment of tuition for the Step I and Step II courses for 30 students per year as well as for the staff support of the Project Manager in years four and five of the grant. At the college level, not only have College of Science Dean Bette Bonder and College of Education and Human Service Dean Jay McLoughlin been highly engaged in this process through proposal planning attendance, financial contributions, and the review of expected changes, but we have also seen engagement from Dean Bahman Ghorashi from the College of Engineering (see attached letters of support). Moreover, the Education College has committed \$127,000 over 5 years to the program and the Science College has committed \$51,000 over the same time period.

It is important to note that as an urban university, the financial commitments outlined above provide *significant* evidence of support for CSUteach and the Noyce Program. Cleveland State is a young university (40 years old) with one of the lowest tuition rates in the state (part of our mission to reach low-income students) and thus has a financial portfolio that cannot be compared to larger, more established universities across the country. While our alumni are finally coming of an age to have the resources to support their alma mater and our academic programs have had the time to gain the reputation they deserve (one reason the University is in the position to begin its first ever capital campaign), Cleveland State to date has survived on its passion for educating academically able students from first generation, low income backgrounds. We have succeeded greatly in this area and will continue to through being focused and supporting strong programs such as the proposed CSUteach.

Evaluation Plan: Dr. Graham Stead has agreed to provide an external evaluation of the Noyce program within the UTeach structure (see attached biosketches). They will have assistance for this task from an institutionally-supported graduate student. Features of their evaluation include:

Course Review: There are two methods for assuring that the CSUteach courses are meeting the needs of our schools and our students. First, Cleveland State has an office of assessment and learning that provides support in the review of courses to determine positive student outcomes and learning. Each summer, this office will be asked to review the pedagogy courses for relevance and appropriate outcomes. Next, the evaluator will annually review the courses and make suggestions for improving the courses to the steering committee. Each course will have a student review after each semester.

Student Assessment: COEHS has developed a comprehensive performance assessment system that will be reviewed and integrated with the UTeach Teacher Development Rubric (TDR). Required by both the State of Ohio Department of Education and the National Council for Accreditation of Teacher Education (NCATE), this current performance assessment system includes evaluation of assignments and tests from

individual courses; observation and evaluation of teaching performance and professional behaviors in course and field experiences; administration and evaluation of standardized and comprehensive examinations; and evaluation of an electronic portfolio (e-portfolio). This performance assessment system is built around the following 12 standards, and during the planning period, these standards will be reviewed and altered in relation to the TDR (see Supplementary Documentation for a description of the standards).

In addition to the above assessment structure that will be integrated with the UTeach system, we will also assess CSU Teach student achievement through GPA as well as Praxis II Principles of Teaching and Learning and Praxis II content specific exams.

Program Data: Three types of data will be collected for the CSU Teach and Noyce Scholars program:

- **Student Feedback:** All Noyce Scholars will have the opportunity to measure the success of their CSU Teach coursework and experiences. For each class, the instructor will provide a mid-term and end of semester survey that tracks student success and satisfaction with the program. This survey will be created by Dr. Stead during the planning year. In addition, at the end of each academic year, student focus groups will be held to get a general understanding of the student experience and methods for improving the experience. Students will also participate in exit interviews upon graduation from the CSU Teach program.
- **Student Data:** Working with CSU's Office of Institutional Research, we will collect appropriate statistics on each student once a semester (Scholars, internship recipients, and Step students). This data includes GPA's, individual demographic information, graduation rates, and retention rates during teaching. This information will be presented in aggregate and disaggregated reports.
- **Student Follow-Up:** The Master Teacher and Advisors will maintain contact with each Noyce student under their charge. If a student does not enroll for a semester, immediate contact will be made to determine what the issue is, and to provide information about university resources that could be helpful in resolving the issue (such as counseling, financial aid or health care).
- **Induction Year Data:** Online surveys will be developed and focus groups will be conducted to review the impact of the CSU Teach program on the teaching practices of the Noyce graduates during their induction years. This data will provide further points for discussion and change to the program.

Intellectual Merit: The proposed Noyce program is embedded within a nationally-recognized model of STEM teacher education called the UTeach model (NAS, 2005), with a significant amount of research conducted around the model (see attached UTeach reference list). This new model for teacher preparation falls outside the traditional college of education, yet retains the important features of the educational field to ensure classroom success. In addition, a strong component of this program is the ability of Cleveland State to push the UTeach model a step forward with its focus on preparing teachers for diverse classrooms. All courses will be infused with research-based theories for delivering content in the urban classroom, including culturally relevant pedagogy and assisting students with exceptionalities.

Broader Impact: The impact of this project goes beyond the Noyce Scholars and Interns supported through this effort. This funding will provide the impetus for Cleveland State to completely redesign its STEM undergraduate teacher education program, aligning it to the UTeach model. Not only will this impact the Noyce students, but it is expected to increase the overall numbers of students pursuing STEM teacher degrees, with those additional students supported financially through state of Ohio scholarships and the TEACH scholarships. Moreover, Cleveland State will be the first institution in Ohio implementing the UTeach model. As the model is implemented, the Chancellor of the University System of Ohio has indicated his interest in expanding the model to other institutions in the state (see letter in Supplementary Documentation). Changing the very nature of teacher education in Ohio will forever alter the landscape of STEM teacher education in the state.

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- Confrey, J., Makar, K., & Kazak, S. (2004). Undertaking data analysis of student outcomes as professional development for teachers. *International Reviews on Mathematics Education (Zentralblatt für Didaktik der Mathematik)*, 36(1), 32-40.
- Confrey, J. & Makar, K. (2003). Critiquing and Improving Data Use from High Stakes Tests: Understanding Variation and Distribution in Relation to Equity Using Dynamic Statistics Software, Paper presented at *Scaling Up Success: A Usable Knowledge Conference at the Harvard Graduate School of Education*, Harvard University.
- Fletcher, F., Luft, J., & Fortney, B. (2005). Punctuated equilibrium or gradual growth? Factors that influence preservice secondary science teachers' beliefs. Presentation at the NARST 2005 Annual Meeting (Dallas, TX).
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- Makar, K. & Confrey, J. (2004). Modeling Fairness of Student Achievement in Mathematics Using Statistical Software by Preservice Secondary Teachers, Paper presented at the *Fourteenth Study of the International Commission on Mathematics Instruction (ICMI-14)*, Dortmund, Germany.
- Makar, K. & Confrey, J. (2005). "Variation-talk": Articulating meaning in statistics. *Statistics Education Research Journal* 4(1), 27-54.
- Makar, K. & Confrey, J. (2003). Clumps, chunks, and spread out: Secondary preservice teachers' reasoning about variation. In C. Lee (Ed), *Proceedings of the Third International Research Forum on Statistical Reasoning, Thinking and Literacy, Lincoln NE (USA)* [CD-ROM]. Mt Carmel: Eastern Michigan University.
- Marshall, J. & Young, E. S. (2006). Pre-service teachers' theory development in physical and simulated environments, *Journal of Research in Science Teaching*, 43 (9), 907-937.
- Marshall, J. A. (2005). Apprentice teachers' conceptions of project-based instruction and their relation to implementation, Proceedings of the NARST 2005 Annual Meeting (Dallas, TX).
- Marshall, J. A. (2004). UTeach: A Model Collaborative Teacher Preparation Program, Presentation at the 2004 Summer Meeting of the American Association of Physics Teachers, Sacramento, CA.
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- Petrosino, A. & Dickinson, G. D. (2003), 'Integrating technology with meaningful content and faculty research: The UTeach Natural Sciences Program.', *Contemporary Issues in Technology and Teacher Education*.
- Silverthorn, D.U. (2006), 'CLAUDE BERNARD DISTINGUISHED LECTURESHIP: Teaching and learning in the interactive classroom', *Advances in Physiology Education* 30, 135-140.
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Stroup, W.M. (2005), 'Learning the Basics with Calculus', *Journal of Computers in Mathematics and Science Teaching* 24.

Stroup, W.M.; Ares, N.M. & Hurford, A.C. (2005), 'A Dialectic Analysis of Generativity: Issues of Network-Supported Design in Mathematics and Science', *Mathematical Thinking and Learning*.

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Joanne E. Goodell, biographical sketch

A. Professional Preparation.

Western Australian Institute of Technology Curtin University of Technology, Western Australia	Mathematics Education	Bachelor of Applied Science, 1983 Graduate Diploma, 1986
Curtin University of Technology, Western Australia	Science Education	Postgraduate Diploma, 1991
Curtin University of Technology, Western Australia	Mathematics Education	Doctor of Philosophy, 1998

B. Appointments

Associate Professor, Mathematics Education, Cleveland State University, August 2005 - Current
Assistant Professor, Mathematics Education, Cleveland State University, August 1999 – May 2005
Research Director, OSI-Discovery, Miami University, Oxford Ohio, January 1999 - August 1999
Associate Lecturer, Equity and Access for Women in Engineering Project, Faculty of Engineering,
Curtin University of Technology, WA, February 1998 - January 1999
Project Officer, Building Educational Diversity in Engineering and Science Project, Teaching
Learning Group, Curtin University of Technology, WA, February 1997 - February 1998
Project Manager, Landscape Project, Project Discovery, Miami University, Ohio, USA, January -July
95
Australian Postgraduate Award Ph.D. scholarship, Science and Mathematics Education Centre, Curtin
University of Technology, WA, 1993-1994 August 95-January 97
Head of Mathematics Department and Mathematics Teacher, St Mark's Anglican Community School,
Hillarys WA, 1988 - 1992
Mathematics and Computing Teacher, St Joachim's High School, Victoria Park WA, 1979 - 1987
Head of Computing, St Joachim's High School, Victoria Park WA, 1985 - 1987

C. Publications

Conway, P., Goodell, J. E., & Carl, J. (2002). Educational reform in the United States: Politics, purposes, and processes. In Griffin, R. (Ed.), *Education in transition: International perspectives on the politics and processes of change* (pp. 83-110). London: Symposium Books.

Goodell, J. E. (2000). Learning to teach mathematics for understanding: The role of reflection. *Mathematics Teacher Education and Development*, 2, 48-61.

Goodell, J. E. (2006). "Using critical incident reflections: A self-study as a mathematics teacher educator." *Journal of Mathematics Teacher Education* 9(3).

Goodell, J. E., & Parker, L. H. (2001). Creating a connected, equitable mathematics classroom: Facilitating gender equity. In Atweh, W., H. Forgasz & B. Nebres (Eds.), *Socio-cultural aspects of mathematics education: An international research perspective*. (pp. 411-431). Mahwah, N.J: Lawrence Erlbaum Associates, Inc.

Goodell, J. E., Parker, L. H., & Kahle, J. B. (2000). Assessing the impact of sustained professional development of middle-school mathematics teachers. In McIntyre, J. & D. Byrd (Eds.), *Research on Effective Models for Teacher Education: Teacher Education Yearbook VIII* (pp. 27-43). Thousand Oaks, CA: Corwin Press.

Goodell, J. E. and B. Yusko (2005). "Overcoming barriers to student participation in online discussions." *Contemporary Issues in Technology Education [Online serial]* 5(1).

D. Synergistic Activities

\$443,000 Regents Summer STEM Academy with the University of Akron and Kent State University from

the Ohio Board of Regents, March 2007 – June 2009. Two cohorts (summer 2007 and summer 2008) Five-week residential summer academy for local high school students to prepare them to enter mathematics teaching as a career.

\$1,900,000 Partnering for Success: Improving mathematics and science teaching and learning in Northeast Ohio School. US. Department of Education through the Ohio Department of Education. Awarded February 15, 2006. Professional development for middle school mathematics and science teachers. Ohio MSP.

\$1,623,198. OMAP 3-6 Design and deployment phases I and II. US. Department of Education through the Ohio Department of Education. November 2004 – June 2006. Ohio MSP Phase I

\$1,623,983. OSCI 3-6 Design and deployment phases I and II. US. Department of Education through the Ohio Department of Education. November 2004 – June 2006. Ohio MSP Phase I

\$1,420,000 for the Cleveland Mathematics and Science Partnership project from the National Science Foundation for improving teacher content knowledge and gaining grades 4-9 license to teach mathematics and science.

\$350,000 for the Northeast Ohio Center of Excellence for Mathematics and Science Teacher Education (NEOCEx) from the Ohio Board of Regents and the Ohio Resource Center, with the University of Akron and Kent State University. June 2002 – June 2009. One of seven Centers in Ohio dedicated to improving teaching and learning of mathematics and science in Ohio's K-16 system. Local middle and high school teachers collaborated with Science faculty to write units of study for middle school teacher candidate content courses and adapt these for middle school classrooms.

E. Collaborators & Other Affiliations.

1. Collaborators.

James Bader, Case Western Reserve University

Linda Gojak, John Carroll University

Debbie Jackson, Department of Teacher Education, Cleveland State University

Sally Mascia, Cleveland Heights-University Heights City School District

Carol Phillips-Bey, Cleveland State University

Brian Yusko, Cleveland State University

2. Graduate and Post Doctoral Advisors

Dr Lesley H. Parker, Curtin University of Technology, Perth, Western Australia

Dr Jane Butler Kahle, Miami University Professor Emeritus

3. Graduate Students Advised

Laura Hammel, Cleveland State University

Sally Mascia, Cleveland Heights-University Heights City School District

Elizabeth O'Donnell, Cleveland Clinic

Matthew Teare, Cleveland Metropolitan School District.

Dr. Debbie K. Jackson

(i) Professional Preparation

Ed.D. Curriculum and Instruction

University of Cincinnati, Cincinnati, Ohio 2000-2004

Dissertation Title: "Effective science teachers: Their content knowledge"

B.S., Education (Comprehensive Science)

Bowling Green State University, Bowling Green, Ohio 1991-1995

Minors in Biology, Chemistry, and General Science

(ii) Appointments

- Assistant Professor, Cleveland State University, Cleveland, Ohio, 2004 – present
- NSF GK-12 Grant Coordinator, University of Cincinnati, Cincinnati, Ohio, 2002-2004
- Instructor, University of Cincinnati, Cincinnati, Ohio, 2001-2004
- High School Science Teacher, Cuyahoga Falls High School, Cuyahoga Falls, Ohio, 1997-2000
- High School Science Teacher, McAuley High School, Cincinnati, Ohio, 1995-1997

(iii) Publications & Refereed Presentations

Jackson, D. & Boboc, M. (2008). Facilitating an inquiry-based classroom, *The Science Teacher*

Jackson, D.K., Goodell, J., & Mascia, S. (2009). School, Teacher, and Student Factors Impacting Students' Science Achievement. Paper accepted for presentation at the National Association for Research in Science Teaching annual meeting, Grove City, CA.

Jackson, D.K. (2009). Incorporating RTOP as an assignment in a science methods course. Paper accepted for presentation at the Association for Science Teacher Educators annual meeting, Hartford, CN.

Jackson, D., Sowell, S., & Gielow, J. (2007, January). *Science teachers' perceptions of personal change: Describing influences of an MSP (Mathematics and Science Partnership) program*. Paper presented at the annual meeting of the Association for Science Teacher Education, Clearwater Beach, FL.

(iv) Synergistic Activities

Goodell, J., Jackson, D., Phillips-Bey, C., Mundell, J., Mascia, S., & Gielow, J. (2006-present). *NSF MSP Collaborative research project*, gathering classroom observations using the Reformed Teaching Observation Protocol as well as student achievement scores to determine the influence of the MSP program at CSU on student achievement and teacher's pedagogical practices

Jackson, D. and Ferguson, R. (2007). *The Interaction of Science, Policy, and Society Lesson Plans*. Funded by the American Association for the Advancement of Science.

Synergistic Activities (continued)

- Jackson, D., Phillips-Bey, C., and Fodor, P. (2008). *Demystifying Math and Science: Unveiling the Secrets to Success Learning Community*, Cleveland State University
- Jackson, D. (2007). *Chemistry curriculum for Partnering for Success*, 4-day high school science teacher institute. Funded by the Ohio Department of Education, Mathematics and Science Partnership Grant
- Jackson, D. (2005). Developed a *Physics by Inquiry Graduate Level Course* for John Marshall High School teachers
- Jackson, D. (2005-2007). *Professional development sequence for Maple Heights High School Teachers*
- Jackson, D., Volk, D., Yusko, B., Price, A. (2007). Developed a process for identifying education students at risk of not successfully completing a licensure program. College of Education and Human Services, Cleveland State University
- Jackson, D., Corrigan, D., & Sowell, S. (2006-2008). Developed day four curriculum of a five day sequence for *Conflict Resolution Education in Teacher Education training*

(v) *Collaborations & Other Affiliations*

a. Collaborators and Co-Editors

James Bader, Department of Biology, Case Western Reserve University

Marius Boboc, Department of Curriculum and Instruction, Cleveland State University

William Donovan, Department of Chemistry, University of Akron

Robert Ferguson, Department of Teacher Education, Cleveland State University

Petru Fodor, Department of Physics, Cleveland State University

Linda Gojak, Center for Mathematics and Science Education, Teaching and Technology, John Carroll University

Joanne Goodell, Department of Teacher Education, Cleveland State University

Tricia Jones, College of Education, Temple University

Dennis Kowalski, Greater Cleveland Educational Development Center, Cleveland State University

Carol Phillips-Bey, Department of Mathematics, Cleveland State University

Jay Reynolds, Department of Biological, Environmental, and Geological Sciences, Cleveland State University

Robert Walters, Teacher, Cleveland Municipal School District

b. Graduate and Postdoctoral Advisors

Robert Burroughs - dissertation chair - professor emeritus at University of Cincinnati

c. Thesis Advisor and Postgraduate sponsor

Masters Project Advisor:

Milena Vucenovic, graduated May 2007

Jose Gonzalez, graduated May 2008

Christopher Malinoski, graduated May 2008

Reta Berry, graduated December 2008

Micheal Juby, currently enrolled

MIRON KAUFMAN

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URL: <http://www.csuohio.edu/sciences/dept/physics/physicsweb/Bios/miron.html>

EDUCATION:

- Post-doctor, Bantrell Fellow in Surface Science, 1983-1985, MIT;
- Ph.D., Physics, 1981, Carnegie-Mellon University;
- M.Sc., Physics, 1977, Tel-Aviv University, Israel;
- B.A., Physics, 1973, Tel-Aviv University, Israel.

POSITIONS HELD:

- 2000-Present, Chair and Professor, Physics Dpt., Cleveland State University;
- 1995-2000, Professor, Physics Dpt., Cleveland State University;
- 1989-95, Associate Professor, Physics Dpt., Cleveland State University;
- 1985-89, Assistant Professor, Physics Dpt., Cleveland State University.

SELECTED PUBLICATIONS:

- ❖ **Potts-percolation-Gauss Model of a Solid.** M. Kaufman and H. T. Diep, Journal of Physics: Condensed Matter 20, 075222 (2008).
- ❖ **Entropy of Electromyography Time Series.** M. Kaufman, U. Zurcher, P. S. Sung, Physica A 386, 698-707 (2007).
- ❖ **Comparison of Spectral and Entropic Measures for Surface EMG Time Series: A Pilot Study,** P. S. Sung, U. Zurcher, M. Kaufman Journal of Rehabilitation Research and Development, 44 (4) 599-609 (2007).
- ❖ **Analytical Model of Fragmentation in Creeping Flow Based on Bateman Equations.** M. Kaufman, Nanoscale and Microscale Thermophysical Engineering 11, 129-136 (2007).
- ❖ **Quantifying Fluid Mixing with the Shannon Entropy.** M. Camesasca, M. Kaufman, I. Manas-Zloczower, Macromolecular Theory and Simulations, 15, 595-607 (2006), featured article.
- ❖ **Staggered Passive Micromixers with Fractal Surface Patterning.** M. Camesasca, M. Kaufman, I. Manas-Zloczower, Journal of Micromechanics and Microengineering, 16, 2298-2311 (2006).
- ❖ **Entropic Characterization of Mixing in Microchannels.** M. Camesasca, I. Manas-Zloczower, M. Kaufman, Journal of Micromechanics and Microengineering, 15, 2038-2044 (2005).
- ❖ **Age Differences in Central (Semantic) and Peripheral Processing: The Importance of Considering Both Response Times and Errors;** Philip A. Allen, Martin D. Murphy, Miron Kaufman, Karen E. Groth, and Ana Begovic, J Gerontol B Psychol Sci Soc Sci 59: P210-P219 (2004).

SYNERGISTIC ACTIVITIES:

- **MS Physics with medical physics and medical imaging specializations**
Developed in collaboration with Cleveland Clinic Foundation, Radiation Oncology and Radiology, 2000-present.
- **Physics Lessons Plans;** U.Zurcher, M.Kaufman, NorthEast Ohio Center for Excellence for Mathematics and Sciences, 2004.
- **Statistical Mechanics with Mathcad;** M. Kaufman, Gordon Conference on Research and Education in Physics, Plymouth NH, 2000;
- **Environmental Physics: a Pedagogical Contribution towards an Interdisciplinary Approach to Environmental Problems;** M. Kaufman, the 11'th Global Warming International Conference, Boston, 2000.

COLLABORATORS:

- Philip Allen, University of Akron;
- Hung Diep, Universite de Cergy-Pontoise France,
- John Ferrante, NASA Glenn Center;
- Petru Fodor, Cleveland State University,
- Puru Gujrati, University of Akron,
- Ica Manas-Zloczower, Case Western Reserve University;
- Paul Scholten, Miami University of Ohio;
- Paul Sung, Cleveland State University,
- Ulrich Zurcher, Cleveland State University.

GRADUATE and POSTDOCTORAL ADVISORS:

- Robert Griffiths, Carnegie Mellon University;
- Nihat Berker, MIT.

Gregory M. Lupton
Cleveland State University
Department of Mathematics

(i) Professional Preparation

University of Leeds (England), Bachelor of Science – Mathematics, 1981

Cambridge University (England), Certificate of Advance Study ('Part III') – Math 1982

University of Edinburgh (Scotland), Doctor of Philosophy in Mathematics 1987. Dissertation Title: *The Intrinsic Formality of Certain Types of Algebras*

(ii) Academic Appointments

2006-Present, Chair, Department of Mathematics, Cleveland State University, Cleveland, Ohio

2000-Present, Professor of Mathematics, Cleveland State University, Cleveland, Ohio

1994-2000, Associate Professor of Mathematics, Cleveland State University, Cleveland, Ohio

1990-1994, Assistant Professor of Mathematics, Cleveland State University, Cleveland, Ohio

1989-1990, Visiting Assistant Professor, Dartmouth College, Hanover, New Hampshire

(iii) Selected Publications

G. Lupton, *Intrinsic Formality and Certain Types of Algebras*, Transactions A.M.S., **319** (1990), 257-283.

G. Lupton, *Note on a Conjecture of Stephen Halperin*, in Topology and Combinatorial Group Theory, Springer Lecture Notes in Math., **1440** (1990), 148-163.

G. Lupton, *algebras Realized by n Rational Homotopy Types*, Proceedings A.M.S., **113** (1991), 1179-1184.

M. Arkowitz and G. Lupton, *Rational Co-H-Spaces*, Commentarii Mathematici Helvetici, **66** (1991), 79-108.

M. Arkowitz and G. Lupton, *Loop-Theoretic Properties of H-Spaces*, Math. Proc. Cambridge Philosophical Society, **110** (1991), 121-136.

G. Lupton and R. Umble, *Rational Homotopy Types with the Rational Cohomology Algebra of Stunted Complex Projective Space*, Canadian Journal of Math., **44** (1992), 1241-1261.

M. Arkowitz and G. Lupton, *Minimal Models of Loop Spaces and Suspensions*, Manuscripta Mathematica, **79** (1993), 415-433.

G. Lupton and J. Oprea, *Symplectic Manifolds and Formality*, Journal of Pure and applied Algebra, **91** (1994), 193-207.

G. Lupton and J. Oprea, *Cohomologically Symplectic Spaces: Toral Actions and the Gottlieb Group*, Transactions A.M.S. **347** (1995), 261-288.

M. Arkowitz and G. Lupton, *On Finiteness of Subgroups of Self-Homotopy Equivalences*, in Proceedings of the Cech Memorial Conference, Contemp. Math., **181** (1995), 1-25.

M. Arkowitz and G. Lupton, *Equivalence Classes of Homotopy-Associative Comultiplications of Finite Complexes*, Journal of Pure and Applied Algebra, **102** (1995), 109-136.

M. Arkowitz and G. Lupton, *On the Nilpotency of Subgroups of Self-Homotopy Equivalences*, in Algebraic Topology: New Trends in Localization and Periodicity (BCAT 1994), Progress in Math., **136** (1996), 1-22, Birkhauser, Basel.

G. Lupton and J. Oprea, *Fixed Points and Powers of Self-Maps of H-Spaces*, Proceedings A.M.S., **124** (1996), 3235-3239.

G. Lupton, *Variations on a Conjecture of Halperin*, in Homotopy and Geometry, Banach Centre Publications, **45** (1998), 115-135.

M. Arkowitz and G. Lupton, *Rational Obstruction Theory and Rational Homotopy Sets*, Mathematische Zeitschrift, **235** (2000), 525-539.

M. Arkowitz, G. Lupton and A. Murillo, *Subgroups of the Group of Self-Homotopy Equivalences*, in Groups of Homotopy Self-Equivalences and Related Topics, Contemp. Math., **274** (2001), 21-32.

- G. Lupton, *The Rational Toomer Invariant and Certain Elliptic Spaces*, in Lusternik-Schnirelmann Category and Related Topics, Contemp. Math., **316** (2002), 135-146.
- G. Lupton and B. Jessup, *Two-Stage Spaces and Torus Actions*, Math. Proc. Cambridge Philosophical Society, **137** (1) (2004), 191-207.
- G. Lupton and S. Smith, *Cyclic Maps in Rational Homotopy Theory*, Mathematische Zeitschrift, **249** (1) (2005), 113-124.
- M. Arkowitz and G. Lupton, *Homotopy Actions, Cyclic Maps and their Duals*, Homology, Homotopy and Applications, **7** (1) (2005), 169-184.
- G. Lupton and S. Smith, *Rationalized Evaluation Subgroups of a Map I: Sullivan Models, Derivations and G-Sequences*, Journal of Pure and Applied Algebra, **209** (2007), 159-171.
- G. Lupton and S. Smith, *Rationalized Evaluation Subgroups of a Map II: Quillen Models and Adjoint Maps*, Journal of Pure and Applied Algebra, **209** (2007), 173-188.
- G. Lupton and S. Smith, *The Evaluation Subgroup of a Fibre Inclusion*, Topology and its Applications, **154** (2007), 1107-1118.
- Y. Felix and G. Lupton, *Evaluation Maps in Rational Homotopy*, Topology, **46** (2007), 493-506.
- G. Lupton and S. Smith, *Rank of the Fundamental Group of any Component of a Function Space*, Proceedings A.M.S., **135** (2007), 2649-2659.

(iv) Synergistic Activities

- *Grants and Awards*
 - Cleveland State University, Research Challenge Grant, 1990, #21019-60351, \$6980
 - Cleveland State University, Research and Creative Activities Award, 1991, Grant #02100-01851, \$3750
 - Cleveland State University, Teaching Enhancement Award, 1996, \$1750
 - Cleveland State University, Developing Faculty Award, 1998, \$2500
 - Mathematische Forschungsinstitute Oberwolfach, Research in Pairs Award, 27th June - 9th July 1999.
 - American Mathematical Society, Summer Research Conference Award. Funding of \$23000 plus administrative support for a conference on Lusternik-Schnirelmann Category, Mount Holyoke College, 29th July-2nd August 2001
 - Cleveland State University, Faculty Merit Recognition Award, 2001
 - Clare Hall, Cambridge University, Visiting Fellowship January – April 2004
- *Example of Educational Activities*
 - Participant alongside colleagues from the science departments and education departments in redeveloping the mathematics education experience for teachers in training. Includes work on the UTeach model and implementation of the model at Cleveland State University.

DAVID W. BALL

Professor of Chemistry

Cleveland State University, Cleveland, OH 44115

(216) 687-2456; d.ball@csuohio.edu; academic.csuohio.edu/ball

EDUCATION

1987 Ph.D., Chemistry, Rice University, Houston, Texas.

Thesis title: "Infrared Spectroscopic Studies of Reactions of Iron Atoms With Cyclic Hydrocarbons in Cryogenic Argon Matrices," J. L. Margrave, advisor (deceased).

1983 B.S., Chemistry, cum laude, Baylor University, Waco, Texas.

EXPERIENCE

2002 – present. Professor of Chemistry, Cleveland State University.

1996 – 2002. Associate Professor of Chemistry, Cleveland State University.

1990 – 1996. Assistant Professor of Chemistry, Cleveland State University.

PUBLICATIONS

1. Ryan M. Richard, David W. Ball. "Ab Initio Calculations on the Thermodynamic Properties of Azaboraspiropentanes" *Journal of Molecular Modeling* **2008**, 14 (9), 871 – 8.
2. Sara L. Brunswick, David W. Ball "Organic Chlorate and Perchlorate Derivatives as High Energy Materials: High-Level Computations on Methyl Chlorate and Methyl Perchlorate" *Journal of Molecular Structure – THEOCHEM* **2008**, 866, 1 – 4.
3. Kelly Y. Mathews, David W. Ball. "New Potential High Energy Materials. High-Level Calculations on the Properties of Aminonitromethanes" *Journal of Molecular Structure – THEOCHEM* **2008**, 868, 78 – 81.
4. Sara L. Brunswick, David W. Ball. "Organic Chlorates and Perchlorates as Potential High Energy Materials. High Level Calculations on the Properties of Dichloratomethane and Bis(perchlorato)methane" *Journal of Undergraduate Chemistry Research* **2008**, 7(4), 141 - 5.
5. John P. Coyne, David W. Ball. "Alpha Particle Chemistry. On the Formation of Stable Complexes Between He²⁺ and Simple Molecules: Implications for Atmospheric and Interstellar Chemistry" *Journal of Molecular Modeling* **2009**, 15, 35 – 40. Digital object identifier: <http://dx.doi.org/10.1016/j.jhazmat.2008.08.057>.

OTHER PUBLICATIONS

1. David W. Ball. "The Chemical Composition of Maple Syrup" *Journal of Chemical Education* **2007**, 84, 1647 – 50.
2. David W. Ball. "Prisms" *Spectroscopy* **2008**, 23 (9), 16 – 21.
3. David W. Ball. "Lenses" *Spectroscopy* **2008**, 23 (12), 16 – 9.
4. David W. Ball. "The Seven Base Units, Part 1" *Spectroscopy* **2009**, 24 (1), 22 – 8.
5. David W. Ball. "Units We May Never (Or Rarely) See" *Journal of Chemical Education* Accepted for publication.

MY Ph.D. COMMITTEE

Dr. John L. Margrave (deceased), Rice University Department of Chemistry; Dr. John S. Hutchinson, Rice University Department of Chemistry; Dr. Joe Hightower, Rice University Department of Chemical Engineering

Ph.D.S SUPERVISED IN LAST FIVE YEARS

Dr. Karen Knaus, Spring 2006, currently at University of Colorado – Denver.

SYNERGISTIC ACTIVITIES

Chair, Cleveland Section, American Chemical Society, 2009. (Includes service as Chair-Elect, 2008.)

Contributing Editor, *Spectroscopy*, 1994 – present.

Reviewer for NSF, Ohio Supercomputer Center, *Journal of Physical Chemistry*, *Journal of Chemical Education*, *High Temperature and Materials Science*, *Chemical Physics*, *Inorganic Chemistry*, *Journal of Hazardous Materials*, *Journal of Molecular Structure*, *Journal of Molecular Modeling*, *Spectrochimica Acta*, ACT, GRE, Praxis testing programs, various textbook companies.

February 19, 2008

STEPHEN F. DUFFY PhD, PE, F.ASCE

Professional Preparation

Undergraduate Institution:	The University of Akron	Civil Engineering	BSCE, 1978
Graduate Institution:	The University of Akron	Civil Engineering	MSCE, 1981
	The University of Akron	Civil Engineering	PhD, 1987

Appointments

Cleveland State University (CSU), Professor of Civil Engineering (September 1985 – present)
Director, CSU Work Zone Safety & Efficiency Transportation Center (June 2004 – present)
Chair, Civil & Environmental Engineering Department, CSU (June 2007 – present)

Publications

- (i) 10 other significant publications
- "Weibull Analysis Effective Volume and Effective Area for a Ceramic C – Ring Test Specimen," S.F. Duffy, *E.H. Baker, A.A. Wereszczak and J.J. Swab, *ASTM Journal of Testing and Evaluation*, Vol. 33, No. 4, pp 233-238, July 2005.
 - "Life Prediction of Structural Components," S.F. Duffy, *L.A. Janosik, A.A. Wereszczak, B. Schenk, A. Suzuki, J. Lamon, and D.J. Thomas, in Progress in Ceramic Gas Turbine Development: Volume 2 Ceramic Gas Turbine Component Development and Characterization, M. van Roode, M.K. Ferber, and D.W. Richerson, volume chairs, ASME Press, pp. 553-606, 2003.
 - "Fine Ceramics (Advanced Ceramics, Advanced Technical Ceramics) - Weibull Statistics for Strength Data," S.F. Duffy, ISO Designation: FDIS 20501, (2003).
 - "Standard Practice for Reporting Uniaxial Strength Data and Estimating Weibull Distribution Parameters for Advanced Ceramics," S.F. Duffy, G. Quinn, and C. Johnson, ASTM Designation: C 1239, (1995, 2000).
 - "C-Ring Strength of Advanced Ceramics," A.A. Wereszczak, R.J. Caspe, , J.J. Swab, S.F. Duffy and *E.H. Baker, *Ceramic Engineering & Science Proceedings of the 27th International Conference on Advanced Ceramics and Composites:B*, W.M. Kriven and H.T. Lin, editors, January 26-31, 2003, Cocoa Beach, Florida, The American Ceramic Society, Westerville, Ohio, pp 483-490.
 - "Size Effects in Ceramic Materials: Computational Issues Associated with Parameter Estimation," S.F. Duffy and *E.H. Baker, Army Research Laboratory Contractors Report (ARL-CR-0560), May 2005.
 - Life Prediction Methodologies and Data for Ceramic Materials, ASTM STP 1201, C.R. Brinkman and S.F. Duffy eds., American Society for Testing and Materials, Philadelphia, 1994..
 - "A Viscoplastic Constitutive Theory for Monolithic Ceramics - I," *L.A. Janosik and S.F. Duffy, *Transactions of the ASME - Journal of Engineering for Gas Turbines and Power*, Vol. 120, No. 1, pp. 155-161, January, 1998..
 - "Trends in the Design and Analysis of Components Fabricated From CFCCs," S.F. Duffy, *J.L Palko, J.B Sandifer, C.L. DeBellis, M.J. Edwards, and D.L Hindman, *Transactions of the ASME - Journal of Engineering for Gas Turbines and Power*, Vol. 119, No. 1, pp. 1-6, January, 1997.

- "An Overview of Engineering Concepts and Current Design Algorithms for Probabilistic Structural Analysis," S.F. Duffy, *J. Hu, and D.A. Hopkins, in Proceedings of the 1995 Design Engineering Technical Conferences - Volume 2, DE-Vol. 83, Boston, Massachusetts, pp. 3-16, September, 1995.

Synergistic Activities

- Principle Investigator and director for the CSU Work Zone Safety & Efficiency Center (June 2004 to present).
- Serves on the ASCE Cleveland Section Board of Directors since 1997. Act as a liaison between the professional community and the academic program at CSU. Also chairs section membership committee and ad hoc committee on education.
- Currently developing the CSU Honors Program in Civil and Environmental Engineering.
- Serves as secretary of the ASCE National Transportation Security Committee. The committee has nearly developed a Transportation Security 101 graduate course which will be implemented into the CSU civil engineering curriculum sometime in the near future.
- Serves as Subcommittee Chair of ASTM C 28.02 Design and Evaluation (1995 to present).

Collaborators & Other Affiliations

(i) Collaborators

Nancy Grugle, Norb Delatte: Cleveland State University
 Osama Jadaan: University of Wisconsin Platteville
 Al Segall: Penn State University
 Andy Wereszczak: DoE Oak Ridge National Laboratory
 Jeff Swab: Army Research Laboratory
 Robert Riddle: DoE Lawrence Livermore National Laboratory
 Eric H. Baker: Connecticut Reserve Technologies
 Bjoern Schenk: Honeywell Engines, Systems & Services
 Akihiko Suzuki: Ishikawajima-Harima Heavy Industries Co., Ltd.
 Jacques Lamon: LCTS, University of Bordeaux
 David J. Thomas: Rolls Royce Engines

(ii) Graduate and Postdoctoral Advisors

David N. Robinson: University of Akron (retired)

(iii) Thesis Advisor and Postgraduate-Scholar Sponsor

Rahul Jain (current – CSU), Andrew Gyekenyesi (Ohio Aerospace Institute), Lesley Janosik (NASA Kennedy Space Center), Scott Maitland (Goodyear Aerospace), Eric Baker (Connecticut Reserve Technologies), Jinbo Hu (Ohio Department of Transportation), Joseph Palko (Connecticut Reserve Technologies), Graduate Students = 6, Post-docs = 0

Robert L. Ferguson

Professional Preparation

Purdue University	Chemical Education	Ph.D. 2003
Purdue University	Chemistry	M.S. 2000
San José State University	Biological Sciences	B.A. 1985

Appointments

Cleveland State University	Assistant Professor	08/03 - present
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Publications

- Ferguson, R. L. (2008). If Multicultural Science Education Standards existed, what would they look like? *Journal of Science Teacher Education*, 19, 547-564.
- Ferguson, R. L. & Bodner, G. M. (2008). Making sense of arrow-pushing formalism. *Chemistry Education: Research and Practice*, 9, 102-113.
- Ferguson, R. L. (2007). Constructivism as a research lens. In G. M. Bodner, & M. Orgill, (Eds), *Theoretical Frameworks for Research in Chemistry/Science Education*. Pearson/Prentice Hall: NJ
- Gado, I, Ferguson, R., & van 't Hooft, M. (2006). Developing Inquiry-based Instruction through Handheld-based Laboratories: Preservice Teachers' Attitude and Self-efficacy. *Journal of Technology and Teacher Education*, 14, 501-529.
- Oku, N., Krishnamoorthy, R., Benson, A. G., Ferguson, R. L., Lipton, M. A., Phillips, L. A., Gustafson, K. R., & McMahon, J. B. (August 19, 2005) Complete Stereochemistry of Neamphamide A and Absolute Configuration of the β -Methoxytyrosine Residue in Papuamide B. *The Journal of Organic Chemistry*, 70, 6842-6847.

Synergistic Activities

Partners for Success (workshop) Life/Earth Science	2006-2009
Principal's workshop (COEHS, & SMART)	April 2006
American Association for the Advancement of Science (AAAS).	2005-06
NEOCEX- Curriculum writing (Chemistry).	Summer, 2005
Principal's workshop (COEHS, GCEDC, & SMART)	Oct, 2004
NEOCEX-Curriculum writing (Physics)	Summer, 2004
NEOCEX- Curriculum writing (Earth Science)	Summer, 2004
CMSD-Summer teachers' workshop	June, 2004
CMSD-Summer Science Institute	June, 2004

Community Service

2004-2009	Director, Cleveland State University Elementary Science Olympiad
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Robert L. Ferguson
Science Education

Collaborators & Other Affiliations

Collaborators

- Debbie K. Jackson, Department of Teacher Education, Cleveland State University.
- Sandra Abell, Director, Science Education Center; Curators' Professor of Science Education, Department of Learning, Teaching, and Curriculum and the Division of Biological Sciences, The University of Missouri.
- Scott Sowell, Department of Teacher Education, Cleveland State University

Graduate Advisor

- George M. Bodner, Department of Chemistry, Purdue University

Thesis Advisor

- Mark A. Lipton, Department of Chemistry, Purdue University

PETRU STEFAN FODOR

Biographical Sketch

Department of Physics
Cleveland State University
Cleveland, OH 44115

Phone: (216) 523 7520
Fax: (412) 523 7268
E-mail: p.fodor@csuohio.com

(a) PROFESSIONAL PREPARATION

- B.Sc. in Physics – Babes – Bolyai University, Romania July 1996
- M.Sc. in Physics – Babes–Bolyai University, Romania -Louis Neel Laboratory, France July 1997
Thesis: “Magnetic frustrations in phase Laves compounds”
- Ph.D. in Physics - Wayne State University, Detroit, Michigan July 2002
Thesis: “Magnetic properties of self-assembled transition metal nanowires”

(b) APPOINTMENTS

- | | |
|----------------|--|
| 2006 - Present | Assistant Professor, Cleveland State University, Ohio |
| 2002 – 2006 | Research Associate, University of Pittsburgh, Pennsylvania |
| 2005 - Summer | Lecturer, University of Pittsburgh, Pennsylvania |
| 1998 – 2002 | Research Assistant, Wayne State University, Michigan |
| 1997 – 1998 | Research Scientist, Wire Industry Company, Romania. |

(c) PUBLICATIONS

- **P.S. Fodor**, G. Tsoi, and L.E.Wenger: “Investigation of magnetic interactions in large arrays of magnetic nanowires”, *Journal of Applied Physics* 103, 07B713 (2008).
- P. Irvin, **P.S. Fodor**, and J. Levy: “Gigahertz optical spin transceiver”, *Optics Express* 15, 11756 (2007).
- **P.S. Fodor**, and J. Levy: “Group IV materials for quantum computation”, invited topical review, *J. Physics: Cond. Matt.* 18, S745 (2006).
- **P.S. Fodor**, S. Rothenberger and J. Levy: “320-channel dual phase lock-in optical spectrometer”, *Rev. Sci. Instrum.* 76, 013103 (2005).
- **P.S. Fodor**, H. Zhu, N.G. Patil and J. Levy: “Variable temperature scanning optical and force microscope”, *Rev. Sci. Instrum.* 75, 2971 (2004).
- **P.S. Fodor**, G. Tsoi, and L.E.Wenger: “Modeling of hysteresis and magnetization curves for hexagonally ordered electrodeposited nanowires”, *Journal of Applied Physics* 93, 7035 (2003)
- **P.S. Fodor**, G. Tsoi, and L.E.Wenger: “Zero magnetization states in electrodeposited $\text{Co}_{0.45}\text{Fe}_{0.55}$ alloy nanowires”, *Journal of Applied Physics* 93, 7438 (2003).
- S.C. Perera, **P.S. Fodor**, G. Tsoi, L.E.Wenger, and S.L. Brock: “Application of the de-silylation strategies to the preparation of transition metal pnictide nanocrystals: The case of FeP”, *Chem. Mater.* 15, 4034 (2003).
- J.A. Aitken, K.L. Stamm, **P.S. Fodor**, L.E.Wenger, and S.L. Brock: “Towards diluted magnetic semiconductor (DMS) phosphides”, *Abstr. Pap. Am. Chem. Soc.* 225, 868-INOR Part 2 (2003).
- **P.S. Fodor**, G. Tsoi, and L.E.Wenger: “Fabrication and characterization of $\text{Co}_{1-x}\text{Fe}_x$ nanowires”, *Journal of Applied Physics* 91, 8186 (2002).
- P. Talagala, **P.S. Fodor**, D. Haddad, R. Naik, L.E.Wenger, P.P.Vaishnava, and V. M. Naik: “Determination of magnetic exchange /stiffness constants in epitaxial $\text{Ni}_{1-x}\text{Co}_x$ (001) ($x < 0.5$) films”, *Phys. Rev. B* 66, 144426 (2002).

- C.S. Lue, F.H. Hsu, H.H. Li, H.D. Yang, Y.K. Kuo, **P.S. Fodor**, and L.E. Wenger: “Thermal hysteresis in the charge-density-wave transition of $\text{Lu}_5\text{Rh}_4\text{Si}_{10}$ ”, *Phys. Rev. B* 66, 033101 (2002).
- M. Chinkhota, **P.S. Fodor**, G.D. Khattak, and L.E. Wenger: “Investigation of the magnetic properties in vanadium-strontium-borate oxide glasses”, *Journal of Applied Physics* 91, 8269 (2002).
- J.L. Nair., S.L. Brock., **P.S. Fodor**, et al., “Synthesis and characterization of copper oxide doped silica aerogels”, *Abstr. Pap. American Chemical Society* 222, 383-INOR Part 1 (2001).
- M.A. Salim, G.D. Khattak, **P.S. Fodor**, L.E. Wenger: “X-ray photoelectron spectroscopy (XPS) and magnetization studies of iron-vanadium phosphate glasses”, *Journal of Non-Crystalline Solids* 289, 185-195 (2001).
- **P.S. Fodor**, L.E. Wenger: “Paramagnetic Meissner effect in Nb disks”, *Physica C* 341, 2043-2044, (2000).

(d) SYNERGISTIC ACTIVITIES

- Reviewer for *Journal of Applied Physics*, *New Journal of Physics*, and *Journal of Physics D*.
- Member of the “Learning Community Initiative” at CSU which focuses on providing students with different perspectives on current research topics.
- Faculty mentor for undergraduate students (currently coordinating undergraduate research experience for two undergraduate students).

(e) COLABORATORS & OTHER AFFILIATIONS

(i) Colaborators

Taysir Nayfeh, Cleveland State University
 Tom Oder, Youngstown State University
 Siu – Tung Yau, Cleveland State University
 Orhan Talu, Cleveland State University
 Paul Hamburger, Cleveland State University
 Gyorgi Tsoi, University of Alabama at Birmingham.

(ii) Graduate and Postdoctoral Advisors

Lowell E. Wenger, University of Alabama at Birmingham
 Jeremy Levy, University of Pittsburgh

(f) HONORS & SOCIETIES

- Faculty Merit Award for Research and Teaching, Cleveland State University, 2008.
- Thomas S. Rumble Graduate Fellowship, Wayne State University, Detroit, Michigan, 2000 – 2002.
- National Scholarship, Babes Bolyai University, Cluj Napoca, Romania, 1994 – 1997.
- American Physical Society, 1998 – Present.
- American Association of Physics Teachers, 2007 – Present.
- Advanced Laboratory Physics Association, 2007 – Present.

Barbara Margolius

Education

Syracuse University	American Studies	B.A.	1977
University of Michigan	Public Policy	M.P.P.	1981
Case Western Reserve University	Operations Research	M.S.	1991
Case Western Reserve University	Applied Mathematics	Ph.D.	1996

Professional Appointments

Director, Honors Program	Cleveland State University	2004 to 2008
Associate Professor of Mathematics	Cleveland State University	2003 to present
Assistant Professor of Mathematics	Cleveland State University	1997-2003
Visiting Assistant Professor of Mathematics	Cleveland State University	1996-1997
Teaching Assistant Mathematics	Case Western Reserve University	1992-1995
NSF Summer Institute	Tsukuba University	Summer, 1993
Consultant, Economic and Statistical Analysis	Cleveland Consulting	1987-1992
Senior Budget and Management Analyst (Comptroller)	City of Cleveland Department of Public Safety	1984-1987
(Senior) Budget and Management Analyst	City of Cleveland Office of Budget and Management	1981-1984
Budget Analyst	NASA Goddard Space Flight Center	1978-1979

Publications:

B.H. Margolius, The matrices R and G of matrix analytic methods and the time-inhomogeneous periodic Quasi-Birth Death Process, *Queueing Systems* 60 (2008), 131 – 151.
http://journals.ohiolink.edu/ejc/pdf.cgi/Margolius_B._H.pdf?issn=02570130&issue=v60i1-2&article=131_tmragoattppq.

B.H. Margolius, Derivative Matching Game, <http://mathdl.maa.org/mathDL/mathDL/47/>, Digital Classroom Resources, (2008).

A.S. Alfa and B.H. Margolius, Two classes of time-inhomogeneous Markov chains, *Annals of Operations Research*, in press (2008).

B. H. Margolius, Transient and Periodic Solution to the Time-Inhomogeneous Quasi-Birth Death Process, *Queueing Systems* 56, (2007) 183-194.
http://journals.ohiolink.edu/ejc/article.cgi?issn=02570130&issue=v56i3-4&article=183_tapstttqdp&search_term=%28margolius%29issn%3D%2802570130%29

B. H. Margolius, Periodic Solution to the Time-Inhomogeneous Multi-server Poisson Queue. *Operations Research Letters* 35, (2007) 125-138.

http://journals.ohiolink.edu/ejc/article.cgi?issn=01676377&issue=v35i0001&article=125_psttmpq

Synergistic Activities

I am coordinating two scholarship grants, both begun in fall of 2008: we have a cohort of 12 students participating in University Scholars in STEM through NSF's S-STEM program, and for the state funded Choose Ohio First grant, we have 28 students participating in a cohort intended to support students majoring in STEM disciplines. The Choose Ohio First grant is in collaboration with five northeast Ohio institutions of higher education. CSU is the lead institution. In conjunction with the Choose Ohio First grant we are also involved in outreach in mathematics to area high schools.

Collaborators

Currently working with A.S. Alfa, University of Manitoba Dept of Mechanical Engineering, on control of queues with time-varying parameters with applications to telecommunications.

Graduate Advisor

Wojbor Woyczynski, Case Western Reserve University, Department of Statistics.
waw@case.edu.

Biographical Sketch for Nigamanth Sridhar

Professional Preparation

- Birla Institute of Tech. & Science, India, Information Systems, M.Sc.(Tech.) (1997)
- Ohio State University, Computer & Information Science, M.S. (2000)
- Ohio State University, Computer Science & Engineering, Ph.D. (2004)

Appointments

- Assistant Professor (2004–present), Department of Electrical and Computer Engineering, Cleveland State University, Cleveland, OH

Most Relevant Publications

1. Manohar Bathula, Mehrdad Ramezani, Ishu Pradhan, Nilesh Patel, Joe Gotschall, and Nigamanth Sridhar. Poster Abstract: Measuring Traffic in Short-Term Construction Work Zones. Proceedings of the ACM/IEEE Conference on Information Processing in Sensor Networks (IPSN'09). April 13-16, 2009. San Francisco CA. To appear. (*features undergraduate research*)
2. Nigamanth Sridhar and Jason O. Hallstrom. A Specification Idiom for Reactive Systems. Proceedings of the 31st International Conference on Software Engineering (New Ideas and Emerging Results Track). May 16-24, 2009. Vancouver, Canada. To appear.
3. Sarthak Grover and Nigamanth Sridhar. GenQA: Automated Addition of Architectural Quality Attribute Support for Java Software. In Proceedings of the ACM Symposium on Applied Computing (Software Engineering Track), Honolulu, HI, USA, March 8-12 2009. To appear.
4. Anish Arora, Mohamed Gouda, Jason Hallstrom, Ted Herman, William Leal, and Nigamanth Sridhar. A state-based language for sensor-actuator networks. *SIGBED Review*, 4(3), July 2007. Special Issues on the Workshop on Wireless Sensor Network Architecture (April 2007).
5. W. P. McCartney and N. Sridhar. Abstractions for safe concurrent programming in networked embedded systems. In *SenSys '06: Proceedings of the 4th international conference on Embedded networked sensor systems*, pages 167–180, New York, NY, USA, 2006. ACM Press.

Other Significant Publications

1. W. P. McCartney and N. Sridhar. Tosdev: a rapid development environment for TinyOS. In *SenSys '06: Proceedings of the 4th international conference on Embedded networked sensor systems*, pages 387–388, New York, NY, USA, 2006. ACM Press.
2. N. Sridhar. Serfs: Dynamically-bound parameterized components. *J. Syst. Softw.*, 80(5):736–749, 2007.
3. A. R. Dalton, J. O. Hallstrom, H. A. Zia, and N. Sridhar. Improving network link quality in embedded wireless systems. In *Proceedings of the 3rd Workshop on Dependable Embedded Systems*, pages 43–48, Leeds, UK, Oct 2006.

4. N. Sridhar and J. O. Hallstrom. A Behavioral Model for Software Containers. In Proceedings of FASE'06: Fundamental Approaches to Software Engineering (Part of ETAPS'06: European Joint Conferences on Theory and Practice of Software), pages 139–154, 2006. Springer-Verlag.
5. N. Sridhar, S. M. Pike, and B. W. Weide. Dynamic module replacement in distributed protocols. In ICDCS '03: Proceedings of the 23rd International Conference on Distributed Computing Systems, page 620, Washington, DC, USA, 2003. IEEE Computer Society.

Synergistic Activities

- *Innovation in teaching:* At Cleveland State University, he has developed course materials for teaching principles of wireless sensor networks, software engineering, software specification and verification at the graduate level. During the five years of his academic appointment, he has consistently received high ratings from his students. In 2006, he was awarded a grant from the CSU University Center for Teaching and Learning for the development of the graduate course, Wireless Sensor Networks. Dr. Sridhar has also been intimately involved in outreach efforts to promote Engineering education in K-12 curricula. He is a participant in the Engineering Education Summer Conference, and organizes the VEX Robotics competition at CSU for area high schools.
- *Professional activities:* Dr. Sridhar is in the fifth year of his tenure-track appointment at Cleveland State University. He has published 30 papers in the areas of wireless sensor networks, software component engineering, software architecture, and distributed system design. His work was previously supported through a grant from the Ohio ICE Consortium, and is currently being supported a CAREER grant (CNS-0746632) from the National Science Foundation.
- *Professional services:* Dr. Sridhar is currently serving on the Technical Program Committee for ICCCN 2009 and SSS 2009, and has served on several other PCs, including ICDCS 2007, TRIDENTCOM 2007, and ICCCN 2008. He has refereed for various journals, conferences, and workshops.

Collaborators and Other Affiliations

Collaborators – Anish Arora (Ohio State University), Jason O. Hallstrom (Clemson University), Ted Herman (University of Iowa), William M. Leal (Ohio University), Vincenzo Liberatore (Case Western Reserve University), Scott M. Pike (Texas A&M University), Murali Sitaraman (Clemson University), Paolo A.G. Sivilotti (Ohio State University), Bruce W. Weide (Ohio State University)

Graduate Advisors – Paolo A.G. Sivilotti and Bruce W. Weide (Ohio State University).

Thesis Advisor and Postgraduate-Scholar Sponsor

M.S: Dhvanish Chokshi, Sarthak Grover, Trisul Kanipakam, Madhu M. Mudigonda, Hamza A. Zia, Dheeraj Bheemidi, Manohar Bathula.

D.Eng.: Adam M. Dutko, William P. McCartney

Number of M.S. students: 7, Number of D.Eng. students: 2

Graham B. Stead, Biographical Sketch

(a) Professional Preparation

Undergraduate Institutions	Major	Degree and Year
University of Port Elizabeth (South Africa)	Psychology & Geography	BA 1977
Graduate Institutions		
University of Port Elizabeth	Psychology	Ph. D. 1989.
Vista University (South Africa)	Psychology	MA (Counseling Psychology) 2004. Registered as a Counseling Psychologist with the Health Professions Council of South Africa. 2004
University of Port Elizabeth	Research Psychology internship (one year)	Registered as Research Psychologist with Health Professions Council of South Africa, 1992.
University of Port Elizabeth	Psychology	MA (Psychology) 1984
University of Port Elizabeth	Education	Higher Education Diploma (post-graduate) 1979
University of Port Elizabeth	Psychology	BA (Honors) 1978

(b) Appointments

2007 Aug 20 to present. Associate Professor with tenure, Department of Curriculum and Foundations, Cleveland State University, OH, USA.

2005 Jan 3 to 2007, Aug 19. Assistant Professor, Department of Curriculum and Foundations, Cleveland State University, OH.

2004 Jan 1 to 2004 Dec 31. Full Professor, Department of Psychology, University of Port Elizabeth, South Africa.

1992 Oct 1 to 2003 Dec 31. Full Professor, Department of Psychology, Vista University, South Africa

1998 Sub-Head (i.e., Campus Dept. Chair), Department of Psychology, Port Elizabeth Campus.

1993 Acting Head (i.e., Chair for all campuses), Department of Psychology, Vista University.

1990 Oct 1 to 1992 Sep 30. Associate Professor, Department of Psychology, Vista University.

1989 Apr 1 to 1990 Sep 30. Senior Lecturer, Department of Psychology, Vista University.

1985 Jan 1 to 1989 March 30. Assistant Professor, Department of Psychology, Vista University.

1980-01-01 to 1984-12-31. School Counselor, Victoria Park High School, Port Elizabeth, South Africa.

1979-01-01 to 1979-12-31. Teacher, Fairbairn High School, Cape Town, South Africa

(c) Publications

Schultheiss, D. E. P., & Stead, G. B. (2008). Ethical issues in testing and assessment. In J. Athanasou & R. V. Esbroeck (Eds.). *International handbook of career guidance* (pp. 603-623). Springer Science & Business Media.

Stead, G. B., & Young, R. A. (2007). Qualitative research methods for a global

- psychology. In M. J. Stevens & U. Gielen (Eds), *Toward a global psychology: Theory, research, intervention, and pedagogy* (pp. 207-232). Mahwah, NJ: Erlbaum.
- Stead, G. B. (2004). Culture and career psychology: A social constructionist perspective. *Journal of Vocational Behavior*, 64, 389-406.
- Stead, G. B., Els, C., & Fouad, N. A. (2004). Perceived career barriers among South African high school learners. *South African Journal of Psychology*, 34, 38-53.
- Stead, G. B., & Schultheiss, D. E. P. (2003). Construction and psychometric properties of the Childhood Career Development Scale. *South African Journal of Psychology*, 33, 227-235.
- Stead, G. B., Watson, M. B., & Foxcroft, C. D. (1993). The relation between career indecision and irrational beliefs among university students. *Journal of Vocational Behavior*, 42, 155-169.
- Stead, G. B., & Watson, M. B. (1993). The Career Myths Scale: Its validity and applicability. *International Journal for the Advancement of Counselling*, 16, 89-97.
- Struwig, F. W., & Stead, G. B. (2001). *Planning, designing and reporting research*. Cape Town, South Africa: Pearson Education.

(d) Synergistic Activities

(i) Currently on Editorial Boards of: *Journal of Occupational and Organizational Psychology*, *Career Development Quarterly*, *Journal of Career Development*, *Journal of Psychology in Africa*.

(ii) Currently Ad-hoc Reviewer for *Journal of Vocational Behavior*.

(iii) Instrument Development: (1) Childhood Career Development Scale to assess children's developmental progress in career awareness and effectiveness of career education interventions, (2) Career Myths Scale to assess dysfunctional career beliefs among adolescents and undergraduate students.

(iv) Developed curricular materials at Vista University for post-graduate students in the following courses: Research methods and statistics; Career psychology. Developed statistics and educational research materials at Cleveland State University for Masters and Doctoral students in Education.

(v) Project Evaluator for *Partnering for Success: Improving mathematics and science teaching and learning in Northeast Ohio Schools*. US. Department of Education Grant through the Ohio Department of Education. 2006-2009.

(e) Collaborators & Other Affiliations

Collaborators and co-editors: Bernstein, N. University of the Witwatersrand, South Africa (SA); Bakker, T. University of Pretoria, SA, Blustein, D. Boston College; DeSouza, E. Illinois State University; Els, C. University of Port Elizabeth, SA; Fouad, N. A. University of Wisconsin-Milwaukee; Foxcroft, C. D., Howcroft, J. G. McCallum, W. Nqweni, Z. C., Seymour, B., Struwig, F. W., Watson, M. B. Nelson Mandela Metropolitan University (NMMU), SA; Ferreira, J., Santos, E. University of Coimbra, Portugal; Schultheiss, D. E. P. Cleveland State University; Subich, L. University of Akron; Young, R. A. University of British Columbia, Canada.

Graduate and Postdoctoral Advisors: van Aarde, J. A. University of Port Elizabeth, SA; Howcroft, J. G., Watson, M. B. NMMU, SA.

Masters Thesis Advisor: Davis, D., Ahfledt, A. NMMU, SA, Chetty, J., Hall, U., Simons, R. Vista University, SA, Swartz, D. University of Port Elizabeth, SA., Owen, B (Cleveland State University). **Doctoral Dissertation Advisor:** Duffy-Friedman, M. (Cleveland State University). Hammel, L. (Cleveland State University).

Biographical Sketch: B. Michael Walton, Co-Principal Investigator

Education and Training

George Washington University, Washington, D.C.	Zoology	B.S., 1980
George Washington University, Washington, D.C.	Biology	M.S., 1984
University of Chicago, Chicago, IL	Evolutionary Biology	Ph.D., 1988
University of California, Irvine, CA	Evolutionary Physiology	Post-doc., 1988-1990

Research and Professional Experience

2005-Present	Director, Environmental Institute, Cleveland State University
1996-Present	Associate Professor, Department of Biological, Geological, & Environmental Sciences, Cleveland State University
2000	Director of Research, Center for Environmental Science, Technology, and Policy, Cleveland State University
1990-1996	Assistant Professor, Department of Biology
1988-1990	Postdoctoral Researcher, University of California, Irvine, CA.

Recent Publications

- Walton, B.M., M. Salling, J. Wyles, and J. Wolin. 2007. Biological integrity in urban streams: toward resolving multiple dimensions of urbanization. *Landscape and Urban Planning* 79: 110-123.
- Walton, B.M., D. Tsatisis, M. Rivera-Sostre. 2006. Salamanders in forest-floor food webs: Invertebrate species composition influences top-down effects. *Pedobiologia* 50: 313-321.
- Walton, B. M. 2005. Salamanders in forest-floor food webs: Environmental heterogeneity affects strength of top-down effects. *Pedobiologia* 49, 381-393.
- Walton, B. M. and S. Steckler. 2005. Contrasting effects of salamanders on forest-floor macro- and mesofauna in laboratory microcosms. *Pedobiologia* 49, 51-60.
- Hickerson, C. M., C. D. Anthony, and B. M. Walton. 2005. Edge effects and intraguild predation in native and introduced centipedes: Evidence from the field and from laboratory microcosms. *Oecologia* 146, 110-119.

Other Relevant Publications

- Balanson, S., B. M. Walton, J. Wolin, and T. Mal. 2005. Aquatic macrophyte diversity and habitat characterization of the Cuyahoga River watershed in northeastern Ohio. *Ohio Journal of Science* 105, 88-96.
- Sharp, C.C., S.E. Steckler, O.M. Lockhart, and B.M. Walton. 2005. *Plethodon cinereus* (eastern red-backed salamander). Predation. *Herpetological Review* 36: 396-397.
- Peterson, C.C., B.M. Walton, and A.F. Bennett. 2000. Metabolic costs of growth in free-living garter snakes and the energy budgets of ectotherms. *Functional Ecology* 13:500-507.
- Peterson, C.C., B. M. Walton, and A.F. Bennett. 1998. Intrapopulation variation in ecological energetics of the garter snake, *Thamnophis sirtalis*. *Physiological Zoology* 71:333-349.
- Varhegyi, G., B.M. Walton, S. Mavroidis, C.A. Conaway and A.R. Gibson. 1998. Population status of anurans in northeastern Ohio. Pages 135-154 *In Amphibians of the Midwest: Ecology and Conservation* (M. Lanoo, ed). Indiana University Press.

Synergistic Activities

- (i) Director, Environmental Institute, Cleveland State University. Responsibilities include developing of inter-disciplinary research collaborations within and beyond the University, establishing partnerships with public and private sector, public outreach and consultation with municipal and state agencies, linkage to K-12 science education community, and coordination of environmental degree programs across campus.
- (ii) Director, Urban Stream Scholars program for training and support of high school science teachers in inquiry-based curricula emphasizing urban ecology (Ohio Board of Regents, \$79,000).
- (iii) Director of summer NSF REU Site for undergraduates, 2003-2007. The REU provided research training and experiences emphasizing the multidisciplinary dimensions of urban watershed ecology.
- (iv) Director of interdisciplinary research project studying effects of urban landscape change on stream watershed ecology supported by the Northeast Ohio Regional Sewer District, through funds from US EPA (\$125,000) and U.S. Clean Water Act, Section 319 (\$199,000).
- (v) Initiated and directed the Cuyahoga River Watershed Project (CRWP), a multi-institutional, interdisciplinary consortium to study urbanized ecosystems within the Cuyahoga River. Funding for project activities and facilities exceeded \$350,000.
- (vi) Founded the Woodlake Environmental Field Station in the Cuyahoga Valley National Park in partnership the US National Park Service. Co-PI for a field station planning grant for the Woodlake station through the NSF Field Station and Marine Laboratories Program (NSF 9907584, \$23,875).

Collaborators within the last 48 months

Carl Anthony, John Carroll University
Robert Krebs, Cleveland State University
Jeff Johansen, John Carroll University
Julie Wolin, Cleveland State University

Graduate Advisors & Post-Doctoral Sponsor

Henry Merchant, George Washington University (MS thesis advisor)
Martin Feder, University of Chicago (PhD thesis advisor)
Albert F. Bennett, University of California, Irvine (Post-doctoral sponsor)

Thesis Advisees

Shimshon Balanson, Cleveland State University College of Law (MS thesis)
Robert Bear, Kansas State University (MS thesis)
Ronald Canterbury, University of Cincinnati (PhD pending)
Barbara Catuzza, attorney, private practice (MS thesis)
Jon Cepek, US Dept of Agriculture (MS thesis)
Elizabeth Congdon, University of Missouri, St. Louis (MS thesis)
Sussana Dzjehok (MS thesis)
Spiro Mavroidis, Defiance College (PhD)
Geza Varhegyi, Cuyahoga Community College (PhD)

BIOGRAPHICAL SKETCH

Provide the following information for the key personnel and other significant contributors in the order listed on Form Page 2.
Follow this format for each person. **DO NOT EXCEED FOUR PAGES.**

NAME Ulrich Zurcher		POSITION TITLE Assistant Professor of Physics	
EDUCATION/TRAINING <i>(Begin with baccalaureate or other initial professional education, such as nursing, and include postdoctoral training.)</i>			
INSTITUTION AND LOCATION	DEGREE <i>(if applicable)</i>	YEAR(s)	FIELD OF STUDY
University of Basel (Basel, Switzerland)	Diploma	1985	Physics & Mathematics
University of Basel (Basel, Switzerland)	Ph.D.	1989	Theoretical Physics

A. Positions and Honors. List in chronological order previous positions, concluding with your present position. List any honors. Include present membership on any Federal Government public advisory committee.

Assistant Professor of Physics, Cleveland State University, 01/2003-present
 Physics Instructor, University of Rhode Island, 08/1999-12/2003
 Adjunct Assistant Professor, Mass College of Pharmacy & Allied Health Sciences, 08/1997-08/1999
 Postdoctoral Researcher, Boston University [Prof. T. Keyes, Chemistry, mentor], 08/1996-08/1999
 Visiting Scientist, M.I.T [Prof. R. J. Silbey, Chemistry, Mentor], 08/1992-08/1996
 Postdoctoral Researcher, Clarkson University [Prof. C. R. Doering, Physics, mentor], 08/1991-08/1992
 Postdoctoral Researcher, M.I.T. [Prof. R. J. Silbey, Chemistry, mentor], 01/1990-08/1991

B. Selected peer-reviewed publications (in chronological order). Do not include publications submitted or in preparation. For publicly available citations, URLs or PMC submission identification numbers may accompany the full reference. Note copies of these publications are no longer accepted as appendix material.

- Zurcher, U. Human Food Consumption: A primer on Nonequilibrium Thermodynamics for College Physics. *Eur J. Phys* 2008; 29:1183-1190.
- Sung P, Zurcher U, and Kaufman M. Reliability Difference between Spectral and Entropic Measures of Erector Spinae Muscle Fatigability. *J Rehab Res Develop* 2008; (accepted for publication).
- Kaufman M, Zurcher U, and Sung P. Entropy of Electromyography Time Series. *Physica A* 2007; 386:698-709.
- Sung P, Zurcher U, and Kaufman M. Comparison of Power Spectrum and Entropic Measures of Electromyography Time Series. *J Rehab Res Develop* 2007; 44:599-609.
- Zurcher U. College Physics with Biomedical Applications at Cleveland State University: A Two-year Experience. *APS Forum of Education Newsletter* 2007.
- Zurcher U. Object Sliding Down a Rough Incline Plane. *Eur J Phys* 2007; 28: 529-536.
- Sung P, Zurcher U, and kaufman M. Nonlinear Analysis of Electromyography Time Series as a Diagnostic Tool for Low Back Pain. *Med Sci Mon* 2005; 11: CS1-5.
- Zurcher U and Keyes T. Comment on Direct Observation of Stretched Exponential Relaxation in Low-Temperature

C. Research Support. List selected ongoing or completed (during the last three years) research projects (federal and non-federal support). Begin with the projects that are most relevant to the research proposed in this application. Briefly indicate the overall goals of the projects and your role (e.g. PI, Co-Investigator, Consultant) in the research project. Do not list award amounts or percent effort in projects.

- Research Corporation: Cottrell Science Grant [\$33K plus \$6K matching];
Mathematical Description of surface electromyography time series.
- Center for Teaching Excellence (CSU) [\$3,120]; Laboratories for College Physics with Biomedical Applications.
- Teaching Enhancement Grant (College of Science-CSU) [\$15K]; Teaching Modules for College Physics with Biomedical Applications.
- EFFRD Grant [\$2k]
- Startup Fund (CSU) [\$30K]

SUMMARY PROPOSAL BUDGET

YEAR 1

ORGANIZATION Cleveland State University				FOR NSF USE ONLY			
				PROPOSAL NO.	DURATION (months)		
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR Joanne E Goodell				AWARD NO.	Proposed	Granted	
				A. SENIOR PERSONNEL: PI/PI, Co-PI's, Faculty and Other Senior Associates (List each separately with title, A.7. show number in brackets)			
	CAL	ACAD	SUMR				
1. Joanne E Goodell - PI	0.00	1.00	2.00	\$	0	\$	
2. Debbie K Jackson - Co-PI	0.00	1.00	0.00		0		
3. Miron Kaufman - Co-PI	0.00	1.00	2.00		0		
4. Gregory Lupton - Co-PI	0.00	1.00	0.00		0		
5.							
6. (0) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)	0.00	0.00	0.00		0		
7. (4) TOTAL SENIOR PERSONNEL (1 - 6)	0.00	4.00	4.00		0		
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)							
1. (0) POST DOCTORAL SCHOLARS	0.00	0.00	0.00		0		
2. (1) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	12.00	0.00	0.00		25,000		
3. (0) GRADUATE STUDENTS					0		
4. (0) UNDERGRADUATE STUDENTS					0		
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)					0		
6. (4) OTHER					27,115		
TOTAL SALARIES AND WAGES (A + B)					52,115		
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)					16,833		
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)					68,948		
D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEEDING \$5,000.)							
TOTAL EQUIPMENT					0		
E. TRAVEL					3,000		
1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSESSIONS)							
2. FOREIGN					0		
F. PARTICIPANT SUPPORT COSTS							
1. STIPENDS	\$	39,222					
2. TRAVEL		0					
3. SUBSISTENCE		0					
4. OTHER		9,250					
TOTAL NUMBER OF PARTICIPANTS (10)				TOTAL PARTICIPANT COSTS	48,472		
G. OTHER DIRECT COSTS							
1. MATERIALS AND SUPPLIES					4,000		
2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION					4,000		
3. CONSULTANT SERVICES					0		
4. COMPUTER SERVICES					0		
5. SUBAWARDS					0		
6. OTHER					0		
TOTAL OTHER DIRECT COSTS					8,000		
H. TOTAL DIRECT COSTS (A THROUGH G)					128,420		
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)					128,420		
K. RESIDUAL FUNDS					0		
L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)				\$	128,420	\$	
M. COST SHARING PROPOSED LEVEL \$ 201,115				AGREED LEVEL IF DIFFERENT \$			
PI/PD NAME Joanne E Goodell				FOR NSF USE ONLY			
ORG. REP. NAME* Craig Zullig				INDIRECT COST RATE VERIFICATION			
		Date Checked	Date Of Rate Sheet	Initials - ORG			

SUMMARY PROPOSAL BUDGET

YEAR **2**

ORGANIZATION Cleveland State University				FOR NSF USE ONLY			
				PROPOSAL NO.	DURATION (months)		
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR Joanne E Goodell				AWARD NO.	Proposed	Granted	
				A. SENIOR PERSONNEL: PI/PI, Co-PI's, Faculty and Other Senior Associates (List each separately with title, A.7. show number in brackets)			
				CAL	ACAD	SUMR	
1.	Joanne E Goodell - none			0.00	1.00	2.00	\$ 0
2.	Debbie K Jackson - none			0.00	1.00	0.00	0
3.	Miron Kaufman - none			0.00	1.00	2.00	0
4.	Gregory Lupton - none			0.00	1.00	0.00	0
5.							
6.	(0) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)			0.00	0.00	0.00	0
7.	(4) TOTAL SENIOR PERSONNEL (1 - 6)			0.00	4.00	4.00	0
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)							
1.	(0) POST DOCTORAL SCHOLARS			0.00	0.00	0.00	0
2.	(1) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)			12.00	0.00	0.00	25,750
3.	(0) GRADUATE STUDENTS						0
4.	(0) UNDERGRADUATE STUDENTS						0
5.	(0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)						0
6.	(6) OTHER						27,115
TOTAL SALARIES AND WAGES (A + B)							52,865
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)							17,075
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)							69,940
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)							1,000
2. FOREIGN							0
F. PARTICIPANT SUPPORT COSTS							
1.	STIPENDS	\$	89,222				
2.	TRAVEL		0				
3.	SUBSISTENCE		0				
4.	OTHER		46,398				
TOTAL NUMBER OF PARTICIPANTS (15)							
TOTAL PARTICIPANT COSTS							135,620
G. OTHER DIRECT COSTS							
1.	MATERIALS AND SUPPLIES						2,000
2.	PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION						4,000
3.	CONSULTANT SERVICES						0
4.	COMPUTER SERVICES						0
5.	SUBAWARDS						0
6.	OTHER						0
TOTAL OTHER DIRECT COSTS							6,000
H. TOTAL DIRECT COSTS (A THROUGH G)							212,560
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)							212,560
K. RESIDUAL FUNDS							0
L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)							\$ 212,560 \$
M. COST SHARING PROPOSED LEVEL \$ 209,560				AGREED LEVEL IF DIFFERENT \$			
PI/PI NAME Joanne E Goodell				FOR NSF USE ONLY			
ORG. REP. NAME* Craig Zullig				INDIRECT COST RATE VERIFICATION			
		Date Checked	Date Of Rate Sheet	Initials - ORG			

SUMMARY PROPOSAL BUDGET

YEAR 3

ORGANIZATION Cleveland State University				FOR NSF USE ONLY			
				PROPOSAL NO.	DURATION (months)		
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR Joanne E Goodell				Proposed	Granted		
				AWARD NO.			
A. SENIOR PERSONNEL: PI/PI, 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. Joanne E Goodell - none	0.00	0.00	2.00	\$	0	\$	
2. Debbie K Jackson - none	0.00	0.00	0.00		0		
3. Miron Kaufman - none	0.00	0.00	0.00		0		
4. Gregory Lupton - none	0.00	0.00	0.00		0		
5.							
6. (0) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)	0.00	0.00	0.00		0		
7. (4) TOTAL SENIOR PERSONNEL (1 - 6)	0.00	0.00	2.00		0		
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)							
1. (0) POST DOCTORAL SCHOLARS	0.00	0.00	0.00		0		
2. (1) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	12.00	0.00	0.00		26,523		
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)					26,523		
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)					8,567		
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)					35,090		
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 \$ _____			114,222				
2. TRAVEL _____			0				
3. SUBSISTENCE _____			0				
4. OTHER _____			52,430				
TOTAL NUMBER OF PARTICIPANTS (15)				TOTAL PARTICIPANT COSTS		166,652	
G. OTHER DIRECT COSTS							
1. MATERIALS AND SUPPLIES					1,000		
2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION					2,500		
3. CONSULTANT SERVICES					0		
4. COMPUTER SERVICES					0		
5. SUBAWARDS					0		
6. OTHER					0		
TOTAL OTHER DIRECT COSTS					3,500		
H. TOTAL DIRECT COSTS (A THROUGH G)					205,242		
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)					205,242		
K. RESIDUAL FUNDS					0		
L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)					\$ 205,242	\$	
M. COST SHARING PROPOSED LEVEL \$ 155,620				AGREED LEVEL IF DIFFERENT \$			
PI/PD NAME Joanne E Goodell				FOR NSF USE ONLY			
ORG. REP. NAME* Craig Zullig				INDIRECT COST RATE VERIFICATION			
		Date Checked	Date Of Rate Sheet	Initials - ORG			

SUMMARY PROPOSAL BUDGET

YEAR 4

ORGANIZATION Cleveland State University				FOR NSF USE ONLY			
				PROPOSAL NO.	DURATION (months)		
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR Joanne E Goodell				AWARD NO.	Proposed	Granted	
A. SENIOR PERSONNEL: PI/PI, 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. Joanne E Goodell - none				0.00	0.00	2.00	\$ 0
2. Debbie K Jackson - none				0.00	0.00	0.00	0
3. Miron Kaufman - none				0.00	0.00	0.00	0
4. Gregory Lupton - none				0.00	0.00	0.00	0
5.							
6. (0) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)				0.00	0.00	0.00	0
7. (4) TOTAL SENIOR PERSONNEL (1 - 6)				0.00	0.00	2.00	0
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)							
1. (0) POST DOCTORAL SCHOLARS				0.00	0.00	0.00	0
2. (1) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)				12.00	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)							0
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)							0
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)							0
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 \$ 114,222							
2. TRAVEL 0							
3. SUBSISTENCE 0							
4. OTHER 58,493							
TOTAL NUMBER OF PARTICIPANTS (15)							
TOTAL PARTICIPANT COSTS							172,715
G. OTHER DIRECT COSTS							
1. MATERIALS AND SUPPLIES							500
2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION							500
3. CONSULTANT SERVICES							0
4. COMPUTER SERVICES							0
5. SUBAWARDS							0
6. OTHER							0
TOTAL OTHER DIRECT COSTS							1,000
H. TOTAL DIRECT COSTS (A THROUGH G)							173,715
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)							173,715
K. RESIDUAL FUNDS							0
L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)							\$ 173,715 \$
M. COST SHARING PROPOSED LEVEL \$ 188,209				AGREED LEVEL IF DIFFERENT \$			
PI/PI NAME Joanne E Goodell				FOR NSF USE ONLY			
ORG. REP. NAME* Craig Zullig				INDIRECT COST RATE VERIFICATION			
				Date Checked	Date Of Rate Sheet	Initials - ORG	

SUMMARY PROPOSAL BUDGET

YEAR 5

ORGANIZATION Cleveland State University				FOR NSF USE ONLY			
				PROPOSAL NO.	DURATION (months)		
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR Joanne E Goodell				AWARD NO.	Proposed	Granted	
A. SENIOR PERSONNEL: PI/PI, 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. Joanne E Goodell - none	0.00	0.00	2.00	\$	0	\$	
2. Debbie K Jackson - none	0.00	0.00	0.00		0		
3. Miron Kaufman - none	0.00	0.00	0.00		0		
4. Gregory Lupton - none	0.00	0.00	0.00		0		
5.							
6. (0) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)	0.00	0.00	0.00		0		
7. (4) TOTAL SENIOR PERSONNEL (1 - 6)	0.00	0.00	2.00		0		
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)							
1. (0) POST DOCTORAL SCHOLARS	0.00	0.00	0.00		0		
2. (1) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	12.00	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)					0		
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)					0		
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)					0		
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 \$			114,222				
2. TRAVEL			0				
3. SUBSISTENCE			0				
4. OTHER			64,588				
TOTAL NUMBER OF PARTICIPANTS (15)				TOTAL PARTICIPANT COSTS	178,810		
G. OTHER DIRECT COSTS							
1. MATERIALS AND SUPPLIES					500		
2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION					500		
3. CONSULTANT SERVICES					0		
4. COMPUTER SERVICES					0		
5. SUBAWARDS					0		
6. OTHER					0		
TOTAL OTHER DIRECT COSTS					1,000		
H. TOTAL DIRECT COSTS (A THROUGH G)					179,810		
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)					179,810		
K. RESIDUAL FUNDS					0		
L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)				\$	179,810	\$	
M. COST SHARING PROPOSED LEVEL \$ 190,314				AGREED LEVEL IF DIFFERENT \$			
PI/PI NAME Joanne E Goodell				FOR NSF USE ONLY			
ORG. REP. NAME* Craig Zullig				INDIRECT COST RATE VERIFICATION			
		Date Checked	Date Of Rate Sheet	Initials - ORG			

SUMMARY PROPOSAL BUDGET

Cumulative

ORGANIZATION Cleveland State University				FOR NSF USE ONLY				
				PROPOSAL NO.	DURATION (months)			
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR Joanne E Goodell				AWARD NO.				
A. SENIOR PERSONNEL: PI/PI, 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. Joanne E Goodell - PI				0.00	2.00	10.00	\$ 0	\$
2. Debbie K Jackson - none				0.00	2.00	0.00	0	
3. Miron Kaufman - none				0.00	2.00	4.00	0	
4. Gregory Lupton - none				0.00	2.00	0.00	0	
5.								
6. () OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)				0.00	0.00	0.00	0	
7. (4) TOTAL SENIOR PERSONNEL (1 - 6)				0.00	8.00	14.00	0	
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)								
1. (0) POST DOCTORAL SCHOLARS				0.00	0.00	0.00	0	
2. (5) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)				60.00	0.00	0.00	77,273	
3. (0) GRADUATE STUDENTS							0	
4. (0) UNDERGRADUATE STUDENTS							0	
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)							0	
6. (10) OTHER							54,230	
TOTAL SALARIES AND WAGES (A + B)							131,503	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)							42,475	
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)							173,978	
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)							4,000	
2. FOREIGN							0	
F. PARTICIPANT SUPPORT COSTS								
1. STIPENDS \$ 471,110								
2. TRAVEL 0								
3. SUBSISTENCE 0								
4. OTHER 231,159								
TOTAL NUMBER OF PARTICIPANTS (70)								
TOTAL PARTICIPANT COSTS							702,269	
G. OTHER DIRECT COSTS								
1. MATERIALS AND SUPPLIES							8,000	
2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION							11,500	
3. CONSULTANT SERVICES							0	
4. COMPUTER SERVICES							0	
5. SUBAWARDS							0	
6. OTHER							0	
TOTAL OTHER DIRECT COSTS							19,500	
H. TOTAL DIRECT COSTS (A THROUGH G)							899,747	
I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE)								
TOTAL INDIRECT COSTS (F&A)							0	
J. TOTAL DIRECT AND INDIRECT COSTS (H + I)							899,747	
K. RESIDUAL FUNDS							0	
L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)							\$ 899,747	\$
M. COST SHARING PROPOSED LEVEL \$ 944,818				AGREED LEVEL IF DIFFERENT \$				
PI/PI NAME Joanne E Goodell				FOR NSF USE ONLY				
ORG. REP. NAME* Craig Zullig				INDIRECT COST RATE VERIFICATION				
		Date Checked		Date Of Rate Sheet		Initials - ORG		

C *ELECTRONIC SIGNATURES REQUIRED FOR REVISED BUDGET

Budget Justification

NSF Noyce Scholarship Program, Year One

A. Senior Personnel: \$27,115 plus benefits. The National Mathematics and Science Institute (NMSI) are matching all costs (including benefits) for senior personnel one-for-one. Senior personnel include the PI and 3 Co-PIs, along with other senior faculty listed elsewhere. All faculty, including the listed Co-PIs and other senior faculty will share these funds for academic year release time. Goodell and Kaufman will receive two months summer salary support from their respective Colleges (Education and Science).

B. Other personnel: \$25,000 plus benefits. We are requesting half of the full time project manager's salary. The other half will be provided through NMSI matching funds. The project manager will be supported by Graduate Assistants (one clerical, one computer/web designer) paid for by the Graduate College as well as Institutional Research for data collection, paid for by CSU. Faculty release time is described above in A.

C. Fringe Benefits: \$16,833 fringe benefits are calculated for both faculty and support staff at 32.3%.

D. Equipment: No equipment is requested

E. Travel: \$3,000 in travel funds are requested for Co-PIs and faculty to travel to the UTeach Institute in Texas for professional development activities. The NMSI is providing an additional \$6,000.

F. Participant Support Costs:

Stipends

Summer internships – \$13,500, \$722 benefits. Internships will commence in Summer 2010. Interns will be paid for 6 weeks at \$450 per week plus fringe benefits calculated at 5.35%. Internship placements will be sought in CSU research labs, summer classes as TAs and summer camps occurring at CSU.

Noyce Scholarships - \$25,000. These will commence in Fall 2010, with 5 students receiving \$5,000 each for Fall semester. These must be awarded no later than the middle of August.

Step I and II Scholarships - \$9,900. These one credit scholarships will be offered to 30 freshmen and sophomores to participate in introductory field experiences on teaching. This is being supported through the Provost's Office at Cleveland State University.

Other

K-12 Mentor Teachers - \$750. Mentor teachers will be paid \$150 per semester for mentoring the Noyce Scholars in field experiences.

Student Materials - \$8,500. For cohort 1, materials requests include but are not limited to graphing calculators, projection devices for graphing calculators, calculator-based laboratory probe ware and other hand-held devices to aid in presenting inquiry-based science and mathematics lessons; text books for the Noyce scholars; instructional materials for STEP 1 and STEP 2 courses.

Master Teacher \$0 For the first year, the master teacher will be supported through NMSI matching funds.

G. Other Direct Costs:

Office supplies: \$4,000 requested for general office supplies, a laptop for Master teacher to use in field experience work, and other office equipment for the master teacher as this is a new position at CSU.

Publication Costs/Documentation/Distribution: \$4,000 requested for publication and mailing of brochures, newspaper and radio advertisements. NMSI will provide an additional \$2,500 towards this.

NSF Noyce Scholarship Program, Year Two

A. Senior Personnel: \$27,115 plus benefits. NMSI continues to match this cost as in the first year. Senior personnel include the PI and 3 Co-PIs, along with other senior faculty listed elsewhere. All faculty, including the listed Co-PIs and other senior faculty will share these funds for academic year release time. Goodell and Kaufman continue to receive two months summer salary support.

B. Other personnel: \$25,750 plus benefits. We are requesting half of the full time project manager's salary. The other half will be provided through NMSI matching funds. The project manager will continue to be supported by Graduate Assistants and Institutional Research, paid by CSU. Faculty release time is described above in A.

C. Fringe Benefits: \$17,075 in fringe benefits calculated for both faculty and support staff at 32.3%.

D. Equipment: No equipment is requested

E. Travel: \$1,000 in travel funds are requested for Co-PIs and faculty to travel to the UTeach Institute in Texas for professional development activities. The NMSI is providing an additional \$6,000.

F. Participant Support Costs

Stipends

Summer internships – \$13,500, \$722 benefits. Internships will continue in Summer 2011. Interns will be paid for 6 weeks at \$450 per week plus fringe benefits calculated at 5.35%.

Noyce Scholarships - \$75,000. Spring 2011 5 students receiving \$5,000 each (cohort 1), plus 10 students in Fall 2011 (cohorts 1 and 2).

Step I and II Scholarships - \$9,900. Cost-share continues for the 1 credit course.

Other

K-12 Mentor Teachers - \$3,000. Mentor teachers will be paid \$150 per semester for mentoring the Noyce Scholars in field experiences. 10 mentors for 2 semesters.

Student Materials - \$9,000. Same materials requested for cohort 2.

Master Teacher - \$26,000 plus \$8,398 fringe (32.2%). Full time master teacher to support 10 Noyce scholars (cohorts 1 and 2), 5 summer interns, teaching STEP 1 and STEP 2 courses. Cost share from NMSI for additional \$20,000.

G. Other Direct Costs

Office supplies: \$2,000 requested for general office supplies.

Publication Costs/Documentation/Distribution: \$4,000 requested for publication and mailing of brochures, newspaper and radio advertisements. NMSI will provide an additional \$2,500 towards this.

NSF Noyce Scholarship Program, Year Three

A. Senior Personnel: Course development is expected to be completed after two years of development, therefore no further support is requested. Goodell will continue to receive two months summer salary support from the College of Education and Human Services.

B. Other personnel: \$26,523 plus benefits. We are requesting half of the full time project manager's salary, with the other half provided through NMSI matching funds. The GA's and IR support continues.

C. Fringe Benefits: \$8,567 is calculated for the project manager's salary calculated at 32.3%.

D. Equipment: No equipment is requested

E. Travel: No travel funds are requested for year 3. The NMSI is providing an additional \$6,000

F. Participant Support Costs:

Stipends

Summer internships – \$13,500, \$722 benefits. Internships will continue in Summer 2012. Interns will be paid for 6 weeks at \$450 per week plus fringe benefits calculated at 5.35%.

Noyce Scholarships - \$100,000. Spring 2012 10 students receiving \$5,000 each (cohort 1 and 2), plus 10 students in Fall 2012 (cohorts 2 and 3).

Step I and II Scholarships - \$9,900. Cost share continues.

K-12 Mentor Teachers - \$3,000. Mentor teachers will be paid \$150 per semester for mentoring the Noyce Scholars in field experiences. 10 mentors for 2 semesters.

Student Materials - \$9,000. Same materials requested for cohort 3.

Apprentice Teacher Support - \$5,000. Cohort 1 will receive \$1,000 each to contribute towards tuition in their Master's degree .

Master Teacher - \$26,780 plus \$8,650 fringe (32.2%). Full time master teacher to support 10 Noyce scholars 5 summer interns, teaching STEP 1 and STEP 2 courses. Cost share from NMSI for additional \$20,000.

G. Other Direct Costs

Office supplies: \$1,000 requested for general office supplies and other office equipment for the master teacher.

Publication Costs/Documentation/Distribution: \$2,500 requested for publication and mailing of brochures, newspaper and radio advertisements. NMSI will provide an additional \$2,500 towards this.

NSF Noyce Scholarship Program, Year Four

A. Senior Personnel: Goodell will continue to receive two months summer salary support from COEHS

B. Other personnel: Support for the project manager position will be assumed by the CSU Provost Office and NMSI, therefore no funds are requested for this in Year 4. GA and IR support continues.

C. Fringe Benefits: No fringe benefits are requested in Year 4.

D. Equipment: No equipment is requested.

E. Travel: No travel funds are requested for year 4. The NMSI is providing an additional \$6,000.

F. Participant Support Costs

Stipends

Summer internships – \$13,500, \$722 benefits. Internships will continue in Summer 2013. Interns will be paid for 6 weeks at \$450 per week plus fringe benefits calculated at 5.35%.

Noyce Scholarships - \$100,000. Spring 2013 10 students receiving \$5,000 each (cohort 2 and 3), plus 10 students in Fall 2013 (cohorts 3 and 4).

Step I and II Scholarships - \$9,900. Cost-share continues.

Other

K-12 Mentor Teachers - \$3,000. Mentor teachers will be paid \$150 per semester for mentoring the Noyce Scholars in field experiences. 10 mentors for 2 semesters.

Student Materials - \$9,000. Same materials requested for cohort 4.

Apprentice Teacher Support - \$10,000. Cohorts 1 and 2 will receive \$1,000 each to contribute towards tuition in their Master's degree.

Master Teacher - \$27,583 plus \$8,909 fringe (32.2%). Full time master teacher to support 10 Noyce scholars 5 summer interns, teaching STEP 1 and STEP 2 courses. Cost share from NMSI for \$20,600.

G. Other Direct Costs

Office supplies: \$500 requested for general office supplies.

Publication Costs/Documentation/Distribution: \$500 requested for publication and mailing of brochures, newspaper and radio advertisements. NMSI will provide an additional \$2,500 towards this.

NSF Noyce Scholarship Program, Year Five

A. Senior Personnel: Goodell will continue to receive two months summer salary support from COEHS

B. Other personnel: Support for the project manager position will be continued by the CSU Provost Office and NMSI, therefore no funds are requested for this in Year 5. GA and IR continues.

C. Fringe Benefits: No fringe benefits are requested in Year 5.

D. Equipment: No equipment is requested.

E. Travel: No travel funds are requested for year 5. The NMSI is providing an additional \$6,000.

F. Participant Support Costs

Stipends

Summer internships – \$13,500, \$722 benefits. Internships will continue in Summer 2014. Interns will be paid for 6 weeks at \$450 per week plus fringe benefits calculated at 5.35%.

Noyce Scholarships - \$100,000. Spring 2014, 10 students receiving \$5,000 each (cohort 3 and 4), plus 10 students in Fall 2014 (cohorts 4 and 5).

Step I and II Scholarships - \$9,900. Cost-share continues.

Other

K-12 Mentor Teachers - \$3,000. Mentor teachers will be paid \$150 per semester for mentoring the Noyce Scholars in field experiences. 10 mentors for 2 semesters.

Student Materials - \$9,000. Same materials requested for cohort 5.

Apprentice Teacher Support - \$15,000. Cohorts 1, 2 and 3 will receive \$1,000 each to contribute towards tuition in their Master's degree .

Master Teacher - \$28,411 plus \$9,177 fringe (32.2%). Full time master teacher to support 10 Noyce scholars 5 summer interns, teaching STEP 1 and STEP 2 courses. Cost share from NMSI, \$20,600.

G. Other Direct Costs

Office supplies: \$500 requested for general office supplies.

Publication Costs/Documentation/Distribution: \$500 requested for publication and mailing of brochures, newspaper and radio advertisements.

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: Joanne Goodell	Other agencies (including NSF) to which this proposal has been/will be submitted.
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: Cleveland Math and Science Partnership	
Source of Support: NSF via Cleveland Metropolitan School District Total Award Amount: \$ 99,552 Total Award Period Covered: 10/01/08 - 09/30/09 Location of Project: Cleveland Metropolitan School District Person-Months Per Year Committed to the Project. Cal:0.00 Acad:0.00 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: Northeast Ohio Center for Excellence	
Source of Support: Ohio Board of Regents Total Award Amount: \$ 143,415 Total Award Period Covered: 07/01/06 - 06/30/09 Location of Project: University of Akron Person-Months Per Year Committed to the Project. Cal:0.00 Acad:0.00 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: Summer STEM academy Cohort 2	
Source of Support: Ohio Board of Regents Total Award Amount: \$ 276,000 Total Award Period Covered: 03/01/08 - 06/30/09 Location of Project: Cleveland State University 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: Ohio MSP Partnering for Success Phase 3	
Source of Support: Ohio Department of Education Total Award Amount: \$ 631,529 Total Award Period Covered: 07/01/08 - 06/30/09 Location of Project: Cleveland State University 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: Choose Ohio First Scholarship Program: Improving STEM Teacher Preparation: A long-term investment	
Source of Support: Ohio Board of Regents Total Award Amount: \$ 627,733 Total Award Period Covered: 01/01/09 - 06/30/13 Location of Project: Miami University Person-Months Per Year Committed to the Project. Cal:0.00 Acad:0.00 Summ:0.00	

*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: Debbie Jackson	Other agencies (including NSF) to which this proposal has been/will be submitted.
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: Partnering for Success: Improving Math and Science Teaching in Northeast Ohio Classrooms	
Source of Support: Ohio Department of Education Total Award Amount: \$ 1,500,000 Total Award Period Covered: 07/01/05 - 06/30/09 Location of Project: Cleveland State University Person-Months Per Year Committed to the Project. Cal:0.00 Acad: 1.00 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: Stephen Duffy	Other agencies (including NSF) to which this proposal has been/will be submitted.
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: University Transportation Center	
Source of Support: U.S. Department of Transportation Total Award Amount: \$ 3,328,000 Total Award Period Covered: 08/01/05 - 07/31/10 Location of Project: Cleveland State University Person-Months Per Year Committed to the Project. Cal:0.00 Acad:0.00 Sumr: 1.50	
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: 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: Nigamanth Sridhar	Other agencies (including NSF) to which this proposal has been/will be submitted.
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: CAREER: Improving the Productivity of the Sensor Network Programmer	
Source of Support: National Science Foundation Total Award Amount: \$ 450,000 Total Award Period Covered: 02/01/08 - 01/31/13 Location of Project: Cleveland State University Person-Months Per Year Committed to the Project. Cal:0.00 Acad:0.00 Sumr: 2.00	
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: Michael Walton	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: URM-Urban Watersheds, Community Health and Well-Being	
Source of Support: National Science Foundation Total Award Amount: \$ 879,854 Total Award Period Covered: 01/01/10 - 12/31/14 Location of Project: Cleveland State University 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: Ulrich Zurcher	Other agencies (including NSF) to which this proposal has been/will be submitted.
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: Undergraduate Physics	
Source of Support: Research Corporation Total Award Amount: \$ 32,000 Total Award Period Covered: 05/01/05 - 05/01/09 Location of Project: Cleveland State University 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.

FACILITIES, EQUIPMENT & OTHER RESOURCES

FACILITIES: Identify the facilities to be used at each performance site listed and, as appropriate, indicate their capacities, pertinent capabilities, relative proximity, and extent of availability to the project. Use "Other" to describe the facilities at any other performance sites listed and at sites for field studies. USE additional pages as necessary.

Laboratory: All laboratories in the College of Science, College of Engineering, and College of Education and Human Services are available for Noyce Scholars to use as part of their content degree and licensure efforts.

Clinical:

Animal:

Computer:

Office:

Other:

MAJOR EQUIPMENT: List the most important items available for this project and, as appropriate identifying the location and pertinent capabilities of each.

OTHER RESOURCES: Provide any information describing the other resources available for the project. Identify support services such as consultant, secretarial, machine shop, and electronics shop, and the extent to which they will be available for the project. Include an explanation of any consortium/contractual arrangements with other organizations.



Department
of Education

Ted Strickland, Governor
Deborah S. Delisle, Superintendent of Public Instruction

March 5, 2009

Dr. Joan T. Rival
Lead Program Director
Division of Undergraduate Education
National Science Foundation
4201 Wilson Blvd.,
Arlington, VA 22230

Dear Dr. Rival:

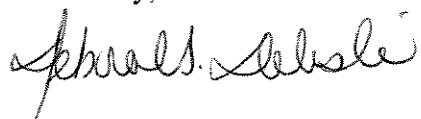
Please accept this letter of support for Cleveland State University's Robert Noyce Scholarship proposal. Securing Federal dollars to help redesign STEM teacher education programs and encourage talented STEM majors to consider careers in teacher education is a goal that is applauded by the Ohio Department of Education. We must change the way we approach STEM teacher education in Ohio and the concepts embedded in Cleveland State's Noyce proposal are very promising. From my understanding of their proposal, those concepts replicate the successful UTeach model that originated from the University of Texas, Austin, with a focus on developing a compact four-year degree program that includes both a content degree and teacher licensure; introducing students early in their careers to the classroom; melding education coursework with science, engineering, mathematics, and technology content areas; and working with highly skilled STEM master and mentor teachers. These are all very important components of strong, future-oriented teacher education programs.

Another feature of the Cleveland State University proposal that we support is the strong partnership with STEM high schools within the Cleveland Metropolitan School District (CMSD). To prepare STEM teachers for the diversity found in any classroom, they must understand all components of that classroom. Working closely with CMSD allows the future teachers to learn how to excite students about STEM concepts and maneuver the often unfamiliar surroundings of a classroom of diverse learners.

As Cleveland State University works to implement the Noyce Scholarship Program, staff at the Ohio Department of Education will work closely with the team to help ensure the smooth transition to the innovative UTeach model that is the basis of their proposal. This includes discussions about licensure as well as accreditation issues. The time for these discussions, however, couldn't be better, as we are closely reviewing our work in teacher education and what that means for institutions of higher learning.

If you have any questions about our commitment to this project, please do not hesitate to contact me.

Sincerely,

A handwritten signature in black ink, appearing to read "Deborah Delisle". The signature is written in a cursive style with a large initial "D".

Deborah Delisle



Board of Regents

Ted Strickland, Governor
Eric D. Fingerhut, Chancellor

University System of Ohio

February 27, 2009

Dr. Joan T. Rival
Lead Program Director
Division of Undergraduate Education
National Science Foundation
4201 Wilson Blvd.,
Arlington, VA 22230

Dear Dr. Rival:

It is my understanding that Cleveland State University is working to secure NSF funding via the Noyce Scholarship Program to help revolutionize their work in STEM teacher education by establishing the highly successful UTeach Initiative on its campus. I write to express my strong support for their effort and to offer my assistance in any way possible in facilitating the process.

I am proud that the faculty and administration of Cleveland State, in collaboration with school districts and community organizations, have committed to take the necessary steps forward to radically change the way mathematics and science teachers are prepared in Ohio. Key features of their program (called CSUTeach) include:

- **Developing a compact four year degree program that includes both a content degree and licensure.**
- **Introducing students early in their careers to the classroom. Melding education coursework with science, engineering, mathematics, and technology content areas.**
- **Working with highly skilled STEM master and mentor teachers.**

As the University System of Ohio works to move STEM education to the forefront, the efforts of Cleveland State will be closely watched as a model to further replicate at other higher education institutions around the state. Ohio is committed to strengthening the educational pipeline for a strong STEM workforce and the work of Cleveland State will definitely help inform our efforts in this area.

We are hopeful that the National Science Foundation will view Cleveland State University's proposal favorably. If you have any questions, please do not hesitate to contact me.

Sincerely,

Eric D. Fingerhut
Chancellor



March 6, 2009

Ms. Joan Prival, Program Director
National Science Foundation
4201 Wilson Boulevard
Room 835
Arlington, VA 22230

Dear Ms. Prival:

The National Math and Science Initiative enthusiastically supports Cleveland State University's (CSU) application for a Noyce Scholarship Program grant. As a supporting partner for CSU implementing a UTeach Program is the primary means of preparing Noyce Scholars, we are committed to financial and technical assistance as described in the proposal.

Cleveland State University is in a unique position to increase the quantity and quality of math and science teachers who will be ready to immediately contribute to the dire shortage of high quality teachers in urban middle and high schools. As the need for teachers competent in their subject areas increases, we have an opportunity to begin to turn around the trend locally and nationally.

The CSU faculty and administration are committed to the kind of collaboration across departments that is so badly needed in developing strong teacher and future education leaders. Providing Noyce Scholars with early and clinical experiences builds a stronger commitment to the profession built on exposure to different and often difficult educational settings. Regular experience and reflection develops the habit of continual self improvement that will pay off in future teaching assignments.

If CSU is successful in its proposal, NMSI will execute a formal contract for its financial, performance management and budget support for the program of \$435,890 over the five year period. We fully expect CSU to demonstrate a high level of success in this venture and beyond the scope of the grant period.

Sincerely,

A handwritten signature in black ink, appearing to read 'John L. Winn', written in a cursive style.

John L. Winn...
Chief Program Officer

March 9, 2009

Ms. Joan Prival, Program Director
National Science Foundation
4201 Wilson Blvd.
Room 835
Arlington, VA. 22230

Ms. Prival:

The Ohio STEM Learning Network (OSLN), is an unprecedented statewide collaborative managed by Battelle and co-funded by the Bill and Melinda Gates Foundation with an aim at building and connecting STEM (Science, Technology, Engineering and Mathematics) teaching and learning capacity in regions across the State of Ohio. At its core, the OSLN is focused on student and teacher success, built from a slate of committed partners from Pre-K-12 education, higher education and business and industry. As a partner in our Northeast Ohio region, Cleveland State University has shown a tremendous amount of leadership in their desire to impact the quantity and quality of teachers with an emphasis on increasing the pipeline of STEM (Science, Technology, Engineering, and Mathematics) educators.

If Cleveland State University is successful in its Noyce proposal, the university and its faculty will be positioned to inform the statewide conversation with the 17 universities and colleges across the state that are partners in the Ohio STEM Learning Network and engaged in work to transform teacher education programs. Additionally, in its management of the Ohio STEM Learning Network, Battelle would consider this as a research and development agenda item for the state efforts around teacher preparation and quality.

As research continues to indicate that teacher quality is the most significant indicator of student success, the Ohio STEM Learning Network is committed to supplying access to the OSLN in support of institutions like Cleveland State University that are eager to redesign their programs and build communities of practice through statewide partnerships. It is this type of collaboration that will impact teaching and learning with a large and sustainable footprint.

Sincerely,



Stephen J. Krak
Senior Research Scientist, Battelle
Program Manager, The Ohio STEM Learning Network



Cleveland State University

College of Science

Office of the Dean

March 9, 2009

To Whom It May Concern:

It is with great enthusiasm that we submit this letter of support on behalf of the College of Science and the College of Education and Human Services to the Robert Noyce Teacher Scholarship Program. We hope not only to assist students pursuing a license to teach mathematics or science, but also to bring the UTeach philosophy to Cleveland State University. Over the last seven years, our colleges have enjoyed a very fruitful collaboration to develop a strong cadre of mathematics and science teachers for the Northeast Ohio region. Examples of this collaboration include recent grants such as an NSF MSP in which CSU partnered with Cleveland Metropolitan School District, Case Western Reserve University, and John Carroll University. At CSU we utilized 1.4 million dollars to redesign the middle childhood mathematics and science licensure programs as well to develop a graduate degree and licensure for practicing teachers in middle childhood mathematics and science. The College of Science and College of Education and Human Services was also awarded a 1.4 million dollar grant from the Ohio Department of Education MSP to provide professional development for practicing teachers in mathematics and science for teachers of grades 3-10. Offering the Noyce Scholarships and making significant changes in our mathematics and science teacher preparation programs is a next logical step in our commitment to providing exceptional education for mathematics and science teachers.

As our collaboration evolves with the Noyce Teacher Scholarship Program toward the adoption of the UTeach philosophy, the College of Science and the College of Education and Human Services recognize that a significant investment of time and effort will be required to make this a success. The College of Science has promised \$51,674 and the College of Education and Human Services has promised \$127,166 for faculty support and time to do the work necessary to make UTeach a reality at CSU. While the activities required to change mathematics and science education are indeed significant, we believe that they are worthwhile and appropriate in order to develop the best mathematics and science teacher education program in Ohio.

If you have further questions about our intentions to utilize the Noyce Teacher Scholarships and make CSUteach a reality, please do not hesitate to contact us (Dean McLoughlin at 216-523-7121 or Dean Bonder at 216-687-5580). Our regional economy is relying on our University to develop the next generation of STEM students and workers. UTeach will help us better meet this need.

Sincerely,

Bette Bonder
Dean, College of Science

James A. McLoughlin
Dean, College of Education
and Human Services



Cleveland State University

Fenn College of Engineering
Office of the Dean

March 9, 2009

To Whom It May Concern:

The Fenn College of Engineering is pleased to enthusiastically support Cleveland State University's efforts to change the way it prepares mathematics and science teachers through the Noyce Teacher Scholarship Program using UTeach as a model. As a premier public engineering college in Northeast Ohio, Fenn College wants to be a major participant in this important initiative in STEM education. We feel strongly that UTeach would enable students to gain the professional coursework, experience, credentials, and internships that are vitally needed to prepare future educators.

Over the past two years the College of Engineering and the College of Education and Human Services have developed a strong working relationship collaborating on several grant proposals. We plan to continue to work very closely with our colleagues in the College of Education and Human Services and the College of Science, and look forward to the opportunity to make engineering a significant part of the CSUteach experience. We will utilize our facilities, ask for our faculty participation in this important partnership, and will inform potential students through the branch offices we have at thirty-four area high schools that participate in our Fenn Academy program, a partnership that also involves local corporations and non-profit organizations. Drs. Nigamanth Sridhar and Stephen Duffy have been involved in the planning of the grant and will continue to work closely with the CSUteach effort.

Please keep us informed of the ongoing progress of this critically needed program, and do not hesitate to contact me if I can be of any further assistance.

Sincerely,

B. Ghorashi

Bahman Ghorashi, Ph.D.
Dean
Fenn College of Engineering

Cleveland State University Teacher Development Rubric

1. **Personal Philosophy.** The CSU teacher education student articulates a personal philosophy of teaching and learning that is grounded in theory and practice.
2. **Social Foundations.** The CSU teacher education student possesses knowledge and understanding of the social, political, and economic factors that influence education and shape the worlds in which we live.
3. **Knowledge of Subject Matter and Inquiry.** The CSU teacher education student understands content, disciplinary concepts, and tools of inquiry related to the development of an educated person.
4. **Knowledge of Development and Learning.** The CSU teacher education student understands how individuals learn and develop and that students enter the learning setting with prior experiences that give meaning to the construction of new knowledge.
5. **Diversity.** The CSU teacher education student understands how individuals differ in their backgrounds and approaches to learning and incorporates and accounts for such diversity in teaching and learning.
6. **Learning Environment.** The CSU teacher education student uses an understanding of individual and group motivation to promote positive social interaction, active engagement in learning, and self-motivation.
7. **Communication.** The CSU teacher education student uses knowledge of effective verbal, nonverbal, and media communication techniques to foster inquiry, collaboration, and engagement in learning environments.
8. **Instructional Strategies.** The CSU teacher education student plans and implements a variety of developmentally appropriate instructional strategies to develop performance skills, critical thinking, and problem solving, as well as to foster social, emotional, creative, and physical development.
9. **Assessment.** The CSU teacher education student understands, selects, and uses a range of assessment strategies to foster physical, cognitive, social, and emotional development of learners and gives accounts of students' learning to the outside world.
10. **Technology.** The CSU teacher education student understands and uses up-to-date technology to enhance the learning environment across the full range of learner needs.
11. **Professional Development.** The CSU teacher education student is a reflective practitioner who evaluates his/her interactions with others (e.g., learners, parents/guardians, colleagues and professionals in the community) and seeks opportunities to grow professionally.
12. **Collaboration and Professionalism.** The CSU teacher education student fosters relationships with colleagues, parents/guardians, community agencies, and colleges/universities to support students' growth and well being.

Sample 4-year plan for Math major + high school licensure under Uteach.

Fall Semester 1				Spring Semester 1			
	MTH Ma	Pedagogy	Gen Ed		MTH Ma	Pedagogy	Gen Ed
MTH181: Calculus I	4	4	QL	MTH182: Calculus II	4	4	QL
ENG101	3		ENG101	ENG102	3		ENG102
FOC	1		FOC	PHY243	5	Sci	NS+L, WAC
BIO200/201	4	Sci	NS+L	Elective	3		
UTeach1: Step 1	1		1	UTeach2: Step 2	1		1
Elective	3						
Semester totals	16			Semester totals	16		
Cumulative totals	16			Cumulative totals	32		
Fall Semester 2				Spring Semester 2			
MTH220: Intro Discrete Math	4	4		MTH286: Diff Eqs	4	4	
MTH288: Linear Algebra	4	4		ANT171	4		SS(NW)
PSY221	3		3 SS	EDC300	3		3 Div, WAC
CHM261/266	5	Sci	NS+L	UTeach3: K&L	3		3
HPR101	1		1				
Semester totals	17			Semester totals	14		
Cumulative totals	49			Cumulative totals	63		
Fall Semester 3				Spring Semester 3			
MTH301	4	4		MTH358	4	4	
MTH323	4	4		MTH396	2	2	
MTH333	4	4		HIS165	4		A&H(NW)
UTeach4: C&I	3		3	UTeach6: Persp	3		3 A&H?
UTeach5: F&M	2		2	UTeach7: RM	3	Sci?	3
Semester totals	17			Semester totals	16		
Cumulative totals	80			Cumulative totals	96		
Fall Semester 4				Spring Semester 4			
MTH401	4	4					
MTH496	4	4		(MTH) Elective	4		
UTeach8: PBI	3		3	Uteach9: ST	10		10
Elective	4	4		Elective	3		
Semester totals	15			Semester totals	17		
Cumulative totals	111			Cumulative totals	128		

Distribution of credit hours			
Math =	46	Science =	14
Pedagogy =	33	Gen Ed =	18
Elective =	17		



CLEVELAND
METROPOLITAN
SCHOOL DISTRICT
Vision to Victory

Eugene T.W. Sanders, Ph.D.

Chief Executive Officer

Eugene T.W. Sanders, Ph.D.
Chief Executive Officer

Board of Education

Robert M. Heard, Sr.
Chair

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Vice Chair

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Louise P. Dempsey
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Willetta A. Milam
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Ex Officio Members

Dr. Michael Schwartz
Dr. Jerry Sue Thornton

1380 East Sixth Street, Cleveland, OH 44114 • 216.574.8500 • Fax 216.574.8193 • www.cmsdnet.net

February 27, 2009

Dr. Joan T. Prival
Lead Program Director
Division of Undergraduate Education
National Science Foundation
4201 Wilson Blvd.,
Arlington, VA 22230

Dear Dr. Rival:

On behalf of Cleveland Metropolitan School District, please accept this letter of support for Cleveland State University's efforts to secure funding from the NSF's Noyce Scholarship Program, using the UTeach model as its program foundation.

As a supporter of this initiative, Cleveland Metropolitan School District is interested in working with Cleveland State during the planning period to fully examine the field experience process in relation to how the NSF Noyce Scholars would be integrated within the District, particularly at our STEM-focused high schools including our new and innovative STEM High School, the Design Lab School, and Max Hayes High School. More specifically, this includes reviewing how we match mentor teachers with the Noyce Scholars; what type of master teachers would be best suited to maintaining linkages between the schools and the university; the best methods for allowing students in the classrooms early in their experiences (the Step 1 and Step 2 courses); and processes for matching the best Noyce Scholar graduates with classroom openings.

We are excited about the potential to see an increase in the number and quality of science and mathematics teachers in Cleveland who are educated and prepared to work in our schools, schools that educate a diverse array of children, the majority of whom are from low-income households. There is an urgent need for these individuals, particularly as our region and state transition from a traditional manufacturing economy to one that targets a knowledge-based, high technology workforce. We are hopeful that the National Science Foundation will be supportive of Cleveland State University's Noyce Scholarship proposal and their efforts to bring UTeach methods to our city.

Sincerely,

Eugene T.W. Sanders, Ph.D.
Chief Executive Officer

*The primary goal of the Cleveland Metropolitan School District is to become
a premier school district in the United States of America.*



THE
UTEACH
INSTITUTE

The University of Texas at Austin

1 University Station-G2550
Austin, TX 78712-0549

OFFICE Painter Hall 4.20
WEB uteach-institute.org

PHONE 512 232 2770
FAX 512 232 1491

March 9, 2009

Dr. Joan Prival, Program Director
National Science Foundation
4201 Wilson Boulevard
Room 835
Arlington, VA 2230

Dear Dr. Prival,

The UTeach Institute strongly endorses the Cleveland State University application for a Noyce Scholarship Program grant. This is a strong proposal from a University that shows a serious commitment to improved STEM teacher preparation. We are also pleased to see that Cleveland State University is making use of new provisions in the Noyce solicitation that broaden permitted use of funds for programmatic costs.

We are facing a national crisis in math and science education in this country. One indicator of this situation is the performance of our math and science students on international exams. Another is the low number of students entering STEM fields. In math and science, student achievement is highly correlated with the level of subject knowledge of the teacher, and most educators believe that the cause of substandard student performance in these areas and low student interest is the lack of qualified math and science teachers in US public schools. This problem is intensifying as baby boomers retire and there are few well-qualified teachers to take their places. The UTeach program was developed to help address this disturbing shortage. It integrates a rigorous math and/or science major, research experience, acquisition of effective teaching techniques, field experience, and certification in a 4-year program. We are proud that it has been cited and is now being used as a national model, and we are working with the National Math and Science Initiative and the Texas Education Agency to assist campuses that wish to replicate this program on an at-cost basis. We have established a help and quality control center called the UTeach Institute to carry out this mission. We would be happy to work with CSU on the same basis as our other national replication sites to replicate the UTeach program.

Sincerely yours,

Mary Ann Rankin
Dean, College of Natural Sciences
Director, National UTeach Replication Effort