



# COVER SHEET FOR PROPOSAL TO THE NATIONAL SCIENCE FOUNDATION

PROGRAM ANNOUNCEMENT/SOLICITATION NO./CLOSING DATE/if not in response to a program announcement/solicitation enter NSF 99-2		<b>FOR NSF USE ONLY</b>	
<b>NSF 99-121</b>	<b>08/30/99</b>	<b>NSF PROPOSAL NUMBER</b>	
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<b>EHR - Directorate for Education &amp; Human Resources</b>			

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NAME OF ORGANIZATION TO WHICH AWARD SHOULD BE MADE	ADDRESS OF AWARDEE ORGANIZATION, INCLUDING 9 DIGIT ZIP CODE
<b>Youngstown State University</b>	<b>Youngstown State University</b>
AWARDEE ORGANIZATION CODE (IF KNOWN)	<b>410 Wick Avenue</b>
<b>0031450000</b>	<b>Youngstown, OH. 445550001</b>

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IS AWARDEE ORGANIZATION (Check All That Apply)  
(See GPG II.D.1 For Definitions)  FOR-PROFIT ORGANIZATION  SMALL BUSINESS  MINORITY BUSINESS  WOMAN-OWNED BUSINESS

TITLE OF PROPOSED PROJECT **CSEMS Technology Leaders Scholarship Program**

REQUESTED AMOUNT \$ <b>200,000</b>	PROPOSED DURATION (1-60 MONTHS) <b>24</b> months	REQUESTED STARTING DATE <b>06/01/00</b>	SHOW RELATED PREPROPOSAL NO., IF APPLICABLE
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CHECK APPROPRIATE BOX(ES) IF THIS PROPOSAL INCLUDES ANY OF THE ITEMS LISTED BELOW

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<input type="checkbox"/> GROUP PROPOSAL (GPG II.D.12)	<input type="checkbox"/> RESEARCH OPPORTUNITY AWARD (GPG V.H)

PI/PD DEPARTMENT <b>Department of Chemistry</b>	PI/PD POSTAL ADDRESS <b>One University Plaza</b>
PI/PD FAX NUMBER <b>330-742-1579</b>	<b>Youngstown, OH 445553663</b>
	<b>United States</b>

NAMES (TYPED)	High Degree	Yr of Degree	Telephone Number	Electronic Mail Address
PI/PD NAME <b>James H Mike</b>	<b>Ph.D.</b>	<b>1986</b>	<b>330-742-3750</b>	<b>jhmike@cc.ysu.edu</b>
CO-PI/PD <b>Robert W Kramer</b>	<b>Ph.D.</b>	<b>1998</b>	<b>330-742-1495</b>	<b>kramer@cis.ysu.edu</b>
CO-PI/PD <b>Scott C Martin</b>	<b>Ph.D.</b>	<b>1984</b>	<b>330-742-1741</b>	<b>scmartin@cc.ysu.edu</b>
CO-PI/PD <b>Bernadette Mullins</b>	<b>Ph D</b>	<b>1995</b>	<b>330-742-1803</b>	<b>bmullins@math.ysu.edu</b>
CO-PI/PD				

## CERTIFICATION PAGE

### Certification for Principal Investigators and Co-Principal Investigators:

I certify to the best of my knowledge that:

- (1) the statements herein (excluding scientific hypotheses and scientific opinions) are true and complete, and  
 (2) the text and graphics herein as well as any accompanying publications or other documents, unless otherwise indicated, are the original work of the signatories or individuals working under their supervision. I agree to accept responsibility for the scientific conduct of the project and to provide the required progress reports if an award is made as a result of this application.

I understand that the willful provision of false information or concealing a material fact in this proposal or any other communication submitted to NSF is a criminal offense (U.S.Code, Title 18, Section 1001).

Name (Typed)	Signature	Social Security No.*	Date
PI/PD <b>James H Mike</b>		*ON FASTLANE SUBMISSIONS* SSNs are confidential and are not displayed	
Co-PI/PD <b>Robert W Kramer</b>			
Co-PI/PD <b>Scott C Martin</b>			
Co-PI/PD <b>Bernadette Mullins</b>			
Co-PI/PD			
Co-PI/PD			

### Certification for Authorized Organizational Representative or Individual Applicant:

By signing and submitting this proposal, the individual applicant or the authorized official of the applicant institution is: (1) certifying that statements made herein are true and complete to the best of his/her knowledge; and (2) agreeing to accept the obligation to comply with NSF award terms and conditions if an award is made as a result of this application. Further, the applicant is hereby providing certifications regarding Federal debt status, debarment and suspension, drug-free workplace, and lobbying activities (see below), as set forth in Grant Proposal Guide (GPG), NSF 99-2. Willful provision of false information in this application and its supporting documents or in reports required under an ensuring award is a criminal offense (U. S. Code, Title 18, Section 1001).

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

#### Debt and Debarment Certifications

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

Is the organization delinquent on any Federal debt?

Yes

No

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

#### Certification Regarding Lobbying

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

#### Certification for Contracts, Grants, Loans and Cooperative Agreements

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

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

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

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

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

AUTHORIZED ORGANIZATIONAL REPRESENTATIVE	SIGNATURE	DATE
NAME/TITLE (TYPED) <b>Peter J. Kasvinsky</b>		<b>08/30/99</b>
TELEPHONE NUMBER <b>330-742-3093</b>	ELECTRONIC MAIL ADDRESS <b>AMGRAD03@ysub.yasu.edu</b>	FAX NUMBER <b>330-742-1580</b>

\*SUBMISSION OF SOCIAL SECURITY NUMBERS IS VOLUNTARY AND WILL NOT AFFECT THE ORGANIZATION'S ELIGIBILITY FOR AN AWARD. HOWEVER, THEY ARE AN INTEGRAL PART OF THE INFORMATION SYSTEM AND ASSIST IN PROCESSING THE PROPOSAL. SSN SOLICITED UNDER NSF ACT OF 1950, AS AMENDED.

**Project Summary:**

This grant will permit the formation of the Technology Leaders Scholarship Program at Youngstown State University. The program will make available \$2,500 per year over a two-year period for up to 40 undergraduate and graduate students. Because the grant is for two years, the target recruitment audience will be entering A.S. and M.S. students and sophomore B.S. students with 2 years remaining in their course of study. The relative number of scholarships to be distributed at each degree level will be approximately 25% A.S., 60% B.S., and 15% M.S., although flexibility will be built into the program with a minimum recruitment goal in each area. The scholarships will be disbursed to students majoring in computer science, mathematics, and engineering, with the ratio of disbursement reflecting the relative population of students currently in those disciplines. Entering students will be required to have a minimum ACT score of 23 or be in the top 20% of their academic class. Continuing students will be required to maintain at least a 3.2/4.0 GPA. Recruitment efforts will focus on the local service area of YSU, with particular emphasis placed on recruitment of minority populations and women. Retention of students through completion of their degree will be achieved through careful selection of candidates, student/student and student/faculty mentoring, tracking, career guidance, and selecting programming aimed at keeping each student focused and maintaining their interest.

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B Table of Contents (NSF Form 1359)	1	_____
C Project Description (plus Results from Prior NSF Support) (not to exceed 15 pages) <b>(Exceed only if allowed by a specific program announcement/solicitation or if approved in advance by the appropriate NSF Assistant Director or designee)</b>	13	_____
D References Cited	1	_____
E Biographical Sketches (Not to exceed 2 pages each)	7	_____
F Budget (NSF Form 1030, plus up to 3 pages of budget justification)	6	_____
G Current and Pending Support (NSF Form 1239)	1	_____
H Facilities, Equipment and Other Resources (NSF Form 1363)	1	_____
I Special Information/Supplementary Documentation	0	_____
J Appendix (List below. ) <b>(Include only if allowed by a specific program announcement/ solicitation or if approved in advance by the appropriate NSF Assistant Director or designee)</b>	_____	_____
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.

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## C. Project Description

### I. Introduction

Youngstown State University (YSU) is a comprehensive urban university with enrollment of 12,000 located in Youngstown, Ohio, midway between Cleveland, Ohio, and Pittsburgh, Pennsylvania. The University's primary service area consists of five counties (Ashtabula, Trumbull, Mahoning, Columbiana, and Jefferson) in northeastern Ohio, and two counties (Mercer and Lawrence) in western Pennsylvania. As the only four-year public institution serving a population of over one million in this service area, YSU has a particular responsibility to provide leadership and services to the region.

The decade of the 1990's has been one of rigorous self-evaluation, exciting changes, and difficult challenges at YSU. During the 1992-93 academic year, the University undertook a major institutional planning effort, culminating with the publication in December, 1994 of "YSU 2000: A Vision for a Premier Metropolitan University". In this document, the University's mission was articulated as follows: "...to create a teaching and learning environment that promotes academic excellence, fosters intellectual growth and scholarship, focuses on the needs of students and the community, and reflects an awareness of cultural and global perspectives and concerns." (YSU, 1994)

Based on the "YSU 2000" vision, an aggressive plan of action was developed, with emphasis on improvements in six main areas - (1) integration of teaching, scholarship, and service; (2) teaching and learning; (3) access and diversity; (4) research and scholarly activity; (5) connections with the community; and (6) institutional environment. Implementation of this plan over the past five years has brought the University much closer to its vision of a "premier metropolitan university". However, regional economic and demographic factors have presented imposing obstacles to change. As a result, several key challenges remain, particularly improving access and diversity, and meeting the needs of the community for education in new technologies.

The current needs of YSU and its service area are closely aligned with the goals of the NSF-CSEMS program. Accordingly, we propose to establish a scholarship program for low-income students who demonstrate exceptional academic talent in the fields of computer science, engineering, engineering technology and mathematics. The objectives of the proposed **Technology Leaders Scholarship Program** are to:

- 1) Enable economically disadvantaged students to pursue full-time study in order to complete an associate, bachelor, or master degree in a timely manner and successfully enter the technology workforce.
- 2) Enhance recruitment of academically talented students, including women and minorities, into technological fields.
- 3) Provide a high quality learning environment that integrates the latest technology.
- 4) Promote student success and degree achievement through quarterly progress meetings with the principal investigators, group meetings and activities in conjunction with the YSU Honors Program, and interaction with faculty.
- 5) Encourage internship and/or co-op experiences through existing programs at YSU and by developing new partnerships with business and industry in the region.
- 6) Facilitate entry into successful technology careers or advanced degrees programs.

The **Technology Leaders Scholarship Program** will make a substantial contribution to the mutual goals of the NSF-CSEMS program and of Youngstown State University, as embodied in the following excerpts from the University's Mission Statement:

*"The University is dedicated to ... addressing the employment and economic needs of the region as a whole; providing knowledge, resources, and leadership to assist area schools, businesses, industries, agencies, and governments; and taking measures to enhance the quality of life for the constituencies it serves."*

*“The University espouses the principles of equal opportunity, affirmative action, and broad access to education; academic access through open admission for all Ohio high school graduates to a wide range of programs; economic access through reasonable tuition and a comprehensive program of financial aid; and programmatic access through careful attention to the collective and individual needs of all its various constituencies....”*

## **II. Results of Prior NSF Support**

The changes implemented during the "YSU 2000" initiative described in the Introduction have resulted in a significant increase in external funding by various departments at Youngstown State University. NSF has funded several grants, although none have direct relevance to this proposal. They have been, however, related to furthering the educational mission of Youngstown State University and of NSF. One of the PI's involved in this grant (S. Martin) has been directly involved in two of them.

NSF DUE 9751151: Brownfields Investigations as an Integrated Approach to Sampling, Sample Preparation, and Analysis (5/97 to 4/99)

This project involved the development of an integrated course employing realistic techniques and procedures needed to affect Phase I and II property assessments of Brownfields. The approach targeted students in environmental studies, chemistry, civil and environmental engineering, biology, and geology. The grant was issued under the Undergraduate Instrumentation and & Laboratory Improvement Program and was used to purchase a Graphite Furnace Atomic Absorption Analyzer and a Gas Chromatograph-Mass Spectrometer, which have been integrated into existing coursework.

NSF DUE 9552347: An Investigative Science Laboratory (8/95 to 7/98)

This multidisciplinary project was also funded under the Undergraduate Instrumentation & Laboratory Improvement Program. Scientific methods of investigation and problem-solving were taught and applied tractable real-world problems to develop students' skills in critical thinking, teamwork, and communication, as well as to enhance the understanding and appreciation of science. Basic laboratory equipment including spectrophotometers, dissolved oxygen and pH meters, centrifuges and personal computers were purchased with grant funds.

Other NSF support given to investigators in the departments of the PI's involved in this grant include:

NSF DUE 9751407: A Computer Laboratory for Mathematics Instruction (8/97 to 7/99)

The project, again funded under the Undergraduate Instrumentation & Laboratory Improvement Program, involved development and integration of a computer laboratory into the Department of Mathematics and Statistics to provide students with the technological tools necessary to solve complex and realistic problems. The classroom consisted of 20 computers networked to a server and connected to the world-wide-web.

NSF DUE 9850079: Investigative Approaches in the Natural Sciences (8/98 to 7/01)

This project is currently active and has been funded by the DUE Course & Curriculum Program. The project addresses the problems associated with science education of non-science majors. Institution-wide

reform in the general education requirements at YSU necessitated the introduction of a science course for non-majors. It was determined that a course integrating an investigative laboratory, scientific method approach would benefit students more than the traditional lecture format. Investigations are on-going.

### **III. Needs Statement and Justification**

#### *Knowledge Workers*

The nation is currently in the advanced stages of a transition to a "new economy", one where applications of advanced technologies and "knowledge workers" are replacing heavy industry and factory workers as the main drivers of economic growth. Some regions (e.g., "Silicon Valley") have already made the transition very effectively, catalyzed by an infusion of brainpower from large research universities (e.g., Stanford). Other regions, particularly the centers (or former centers) of heavy industry (e.g., northeast Ohio), have struggled with this transition. These areas now urgently need the leadership of universities to provide the entrepreneurs, technology transfer, and skilled "knowledge workers" necessary for economic development.

Nowhere is this need more urgent than in the YSU service area. In the first half of the 20<sup>th</sup> century, steel mills in the Mahoning River valley produced up to 15% of the nation's steel. The local economy was devastated in the late 1970's and early 1980's by the closing of several large mills. Since then, the economy has recovered slowly. However, this recovery has been hampered by the deterioration of inner cities, a scarcity of high-paying jobs, and the lack of entrepreneurs and workers with technical education to support the growth of viable new businesses. By expanding efforts to recruit and mentor academically talented students in computer science, engineering, and mathematics at YSU, the Technology Leaders Scholarship Program will expand the education base of the service area. By providing these scholars with internship and co-op experiences, they will be ready to contribute effectively to businesses in the service area or elsewhere upon graduation.

#### *Access*

Access is one of YSU's strengths, but also a continuing need. Admission to the University is open to all high school graduates, and tuition is among the lowest in the state of Ohio. In addition, 75% of students receive some form of financial aid (scholarships, grants, loans, and/or on-campus employment). Nevertheless, many students struggle to meet the cost of tuition. Roughly 28% of students enrolled in Fall, 1998 attended YSU only part-time, while most of the full time students rely on financial aid. The situation is exacerbated by the depressed economic condition of the University's service area. As shown in Table 1, the median income for the YSU service area is well below state and national figures. Exit interviews conducted in 1996 indicated that financial and scheduling difficulties were among the most common reasons full-time students left YSU.

NSF defines financial need for undergraduate students as eligibility for Pell Grants. Of 11,326 undergraduate students enrolled at YSU in Fall of 1998, 32.7% were eligible for Pell Grants. There is clearly a need for further efforts to provide the financial resources for academically talented students to attend YSU. The proposed project will provide essential financial aid for up to 40 deserving students. In addition, it is expected that the process of recruiting and evaluating candidates for the scholarships will lead to a better understanding of the needs and concerns of low income residents of the service area.

#### *Diversity*

The North Central Association (NCA) of Colleges and Schools reported overwhelmingly positive impressions of YSU following their accreditation visit in 1998. However, one area cited for future improvement was diversity. The NCA team noted that "the university is supporting activities designed to ...

**Table 1. Population, Income, and Poverty in the Youngstown State University Service Area - 1996  
Figures (U.S. Census Bureau, 1999).**

Area	Population	Median Income	% in Poverty
Ashtabula County (OH)	103,300	\$29,707	14.2
Columbiana County (OH)	111,521	\$30,139	14.0
Jefferson County (OH)	74,558	\$27,538	15.5
Mahoning County (OH)	255,165	\$28,831	15.3
Trumbull County (OH)	225,066	\$34,487	11.2
Lawrence County (PA)	94,887	\$28,302	14.5
Mercer County (PA)	121,938	\$30,207	13.4
State of Ohio	11,209,493	\$33,958	11.3
State of Pennsylvania	12,001,451	\$34,437	11.4
United States	265,179,411	\$36,306	13.7

increase the diversity of its campus community", and "progress has been made in the past ten years." However, they concluded "minorities continue to be underrepresented among the faculty, staff and students, particularly for an institution with a metropolitan mission." (NCA, 1998)

Minorities make up about 9.6% of the student body, 10.8% of the faculty, and 12.2% of the staff at YSU (YSU, 1998), compared to 9.9% of the service area population and 19.7% in Mahoning County, where YSU is located (U.S. Census Bureau, 1999). African-Americans are the dominant minority group at YSU, accounting for over 75% of the minority student population. Women make up 55.0% of the student body, 32% of the faculty, and 56% of the staff at YSU. Minority enrollment in the computer science, engineering, engineering technology, and mathematics programs is even lower than the student body as a whole. The enrollment of women in these fields is also low (in the range of 20-25%), but is comparable to national averages.

YSU is striving to create an educational environment that promotes and values racial, ethnic and gender diversity. The Technology Leaders Scholarship Program will contribute toward that goal through an aggressive program to identify, recruit, and mentor talented minorities and women.

#### *Recruitment and Retention*

Youngstown State University and other urban four-year institutions in Ohio have experienced steep declines in enrollment during the 1990's. Between 1990 and 1996, enrollment at YSU declined by 17.2%. By comparison, enrollment at the University of Toledo declined by 12.5%, Cleveland State University by 17.8%, and the University of Akron by 21.5% (YSU, 1998). In 1992, the University established the Office of New Student Relations, which has since been merged with the Admissions Office to create the Office of Undergraduate Recruitment and Admissions. This office has served to expand the size and diversity of the pool of undergraduate applicants. Despite several new recruiting efforts, enrollment declines persisted due to inherent demographic and economic trends in the YSU service area.

Enrollment trends in computer science, engineering, engineering technology, and mathematics at YSU are summarized in Table 2. Of 1468 students enrolled in these disciplines in Fall of 1998, 278 (19.0%) were in Associate degree programs, 1109 (75.5%) in Bachelor degree programs, and 81 (5.5%) in Master degree programs. While total enrollment in the target disciplines has remained fairly stable, engineering enrollment has declined faster than the University as a whole. This is due in part to an increasing scarcity of attractive jobs in the local area. With the recent increase in demand and starting salaries for graduates in all of these fields, engineering and mathematics enrollment has begun to stabilize, while computer science enrollment has increased dramatically. With improving demographic factors (e.g., the "baby boom echo") and more



aggressive recruiting, modest increases in enrollment are expected in the future. The Technology Leaders Scholarship Program will provide an attractive incentive to students in the target fields, and serve to accelerate increases in enrollment.

**Table 2. Trends in Total (Undergraduate and Graduate) Enrollment at Youngstown State University.**

Field	Total Enrollment		
	Fall, 1990	Fall, 1994	Fall, 1998
Computer Science	190	337 <sup>a</sup>	537
Engineering	755	742	564
Engineering Technology	702	405 <sup>a</sup>	303
Mathematics	90	68	64
University Total	15,454	13,979	12,533

a - Note: Computer Technology program moved from Engineering Technology to Computer Science in Fall, 1994.

Like most open-admission universities, YSU faces a difficult challenge in student retention. In fall of 1996, the retention rate at YSU was measured at 68%, compared to a national average of 63% for all open-admission universities. The University has implemented several programs to improve the evaluation, preparedness, and academic development of freshman students. Some of these are discussed in the next section (Qualifications of YSU). One approach applied is the use of scholarship money to attract academically prepared students. Any student with a minimum ACT of 25 or SAT of 1140 and in the top 15% of their graduating class now automatically receives a scholarship of at least \$2,000. As a result, the average composite ACT score of incoming freshmen increased from 19.45 in 1991 to 20.29 in 1997. The percentage of incoming freshmen with ACT scores of 23 or above increased from 20.6% to 30.7% during the same period. It is essential that the University continue to expand these scholarship incentive programs, in particular to ensure the growth and vitality of academically challenging fields such as computer science, engineering, and mathematics.

#### **IV. Qualifications of YSU**

##### *General*

Youngstown State University has all of the academic programs, facilities, and support services required for successful implementation of a NSF-CSEMS project. At YSU, participants in the Technology Leaders Scholarship Program will find: excellent programs in all of the target disciplines; faculty, staff, and administration dedicated to serving students; modern computer, laboratory, and library facilities; an attractive, centralized campus; many programs to stimulate their intellectual development; support services to monitor and facilitate their academic progress; and assistance in locating internship experiences and post-graduation employment. In May of 1998, the University received continued accreditation through 2007-08 from the North Central Association (NCA) of Colleges and Schools. In making their recommendation, the NCA Evaluation Team made the following observations:

*“The university is characterized by many strengths, including excellent presidential and board leadership; a strong, shared, and operative sense of a metropolitan mission;...strong partnerships with the local community and region; an excellent self-study process leading to an effective evaluation of strengths and concerns; a successful downsizing plan and process to address a*

*demographically-induced decline in enrollment;...a dedicated, hard-working, student-oriented faculty; a motivated student body; and well maintained physical facilities...”*

### *Academic Programs*

In the target disciplines for this project, YSU offers the following degree programs:

- 1) Associate in Applied Science (AAS) in Computer Information Systems
- 2) Bachelor of Science in Applied Science (BSAS) in Computer Information Systems
- 3) Bachelor of Science (BS) in Computer Science
- 4) Bachelor of Science (BS) in Mathematics & Statistics
- 5) Master of Science (MS) in Mathematics & Statistics
- 6) Bachelor of Engineering (BE) in
  - a) Chemical Engineering
  - b) Civil & Environmental Engineering
  - c) Electrical Engineering
  - d) Industrial & Systems Engineering
  - e) Mechanical Engineering
- 7) Master of Science (MS) in Engineering in
  - a) Civil & Environmental Engineering
  - b) Electrical Engineering
  - c) Industrial & Systems Engineering
  - d) Mechanical Engineering
- 8) Associate in Applied Science (AAS) in
  - a) Civil Engineering Technology
  - b) Drafting and Design Technology
  - c) Electrical Engineering Technology
  - d) Mechanical Engineering Technology
- 9) Bachelor of Science in Applied Science (BSAS) in
  - a) Civil Engineering Technology
  - b) Electrical Engineering Technology
  - c) Mechanical Engineering Technology

In addition, a proposal for a Master of Science (MS) in Computer Science is currently under review by the Ohio Board of Regents. Thus, YSU offers programs in all disciplines, and at all degree levels, targeted by the NSF-CSEMS program.

### *Academic Excellence*

Historically, the primary focus at YSU has been on excellence in undergraduate education. Students typically benefit from small classes taught by full-service professors. This is particularly true in the technical disciplines targeted by this proposal. In this environment, ample opportunity exists for mentoring of students by experienced faculty members. Personal attention is available to students when academic difficulties arise. In addition, faculty organize and encourage students to participate in a number of career-related extracurricular activities that enhance academic, personal, and professional development, promote camaraderie, and improve retention. Examples of such activities include the following:

- Mathfest – annual conference sponsored by Pi Mu Epsilon
- William Lowell Putnam Competition – prestigious mathematical problem-solving contest
- COMAP Mathematical Modeling Contest – international contest in applied modeling
- ACM International Programming Contest - computer programming competition
- High-Mileage Vehicle Competition – Student Chapter, American Society of Mechanical Engineers

- Baja Car Competition - Student Chapter, American Society of Mechanical Engineers
- Steel Bridge Building Competition – Student Chapter, American Society of Civil Engineers
- Concrete Canoe Race – Student Chapter, American Society of Civil Engineers

YSU has met the requirements for all accreditations available in the target disciplines. All Bachelor of Engineering (BE) programs at YSU are fully accredited by the Accreditation Board for Engineering and Technology (ABET). In addition, all AAS and BSAS programs in Engineering Technology are accredited by ABET as well.

Since 1992, the University administration has placed increased emphasis on the integration of teaching, research, and public service. One result has been an increase in external funding from an annual average of \$300,000 in 1991-94 to over \$1.5 million in 1997-99. Several research and outreach centers have been established with a combination of internal and external funding. These include the Center for Engineering Research and Technology Transfer (CERTT) and the Mahoning River Basin Research Center. This effort has had many positive effects, including improvements in academic programs, greater opportunities for student research and on-campus employment related to their disciplines, stronger connections to local communities and businesses, and greater visibility for the University outside the service area.

Another measure of excellence in academic programs is the ability of graduates to complete advanced degrees at top universities throughout the nation. YSU graduates have been very successful in this regard. Graduates from YSU's computer science, engineering, and mathematics programs have received graduate degrees from the University of California at Berkeley, Brown University, Chicago University, Cornell University, Johns Hopkins University, Duke University, the University of Pennsylvania, Ohio State University, the University of Pittsburgh, and several others. YSU graduates in these disciplines currently hold faculty positions at Clemson University, Ball State University, Cleveland State University, and YSU.

The University's commitment to excellence in teaching and learning is perhaps best exemplified by the University Scholars Program, which was established in 1992. The program recognizes academic excellence by awarding full tuition, room and board, and books to 45 high-achieving incoming freshmen and 10 associate degree recipients each year. To qualify, entering freshmen must have a composite ACT score of 28 or higher and rank in the top 15% of their high school graduating class. To remain in the program, students must maintain a GPA of 3.5 or higher. All University Scholars are enrolled in the Honors Program. They live in Cafaro House, a new state-of-the-art honors residence facility that houses the offices of the Honors Program, a computer lab, a seminar room, and music practice rooms. University Scholars must complete at least 60 hours of community service each year.

The Honors Program is open to all YSU students who maintain a GPA of 3.4 or higher. The program is designed to bring together exceptional students from diverse disciplines and challenge them with extraordinary courses and learning experiences outside the classroom in order to develop their full cultural and intellectual potential. The Honors curriculum includes special courses, seminars, independent study opportunities, and off-campus experiences. Participants in the Technology Leaders Scholarship Program will be strongly encouraged to enrich their experience at YSU by participation in the Honors Program.

### *Academic Support Facilities*

To maintain a state-of-the-art teaching/learning environment at YSU, academic support facilities are upgraded almost continuously. Considerable effort and resources have been devoted to improving computer capabilities and access. Meshel Hall, dedicated in 1986, is the University's main center for academic and administrative computer application. An advanced facility for instruction and research in computer technology, the four-story building houses seven classrooms, twelve specialized computer laboratories, the University's mainframe computers, offices of the Computer Center staff, and the Department of Computer Science and Information Systems. All other academic buildings also contain satellite computer labs and related facilities. The Engineering Science Building underwent a \$6.9 million renovation in 1995-96. The

centerpiece of this renovation was the creation of a centralized computer laboratory complex housing a network of over 60 Pentium PCs with Internet access and two multimedia classrooms.

The University's most ambitious technology infrastructure project is the Electronic Campus plan. From 1994 to 1998, the University invested nearly \$17 million in the development of the Electronic Campus. This included the acquisition of a new enterprise server; installation of inter-building fiber optic cabling; installation of intra-building wiring; installation of network electronics and software; purchase of new PCs for faculty, students, and staff; development of multimedia classrooms; and training of faculty and staff in the use of new facilities.

Another key resource for faculty and students is Maag Library. Over the past six years, while the University has implemented significant budget reductions, the operating budget for Maag Library was increased by 50%, primarily to support the computerization of the catalog of holdings and access to on-line searching and borrowing. Maag Library is a charter member of OhioLINK, a computer network offering access to a combined catalog of over six million records at Ohio universities and colleges and the State Library of Ohio. This and other cooperative agreements, along with access to electronic journals and databases, have resulted in vast improvements in the amount and accessibility of information available to YSU faculty and students.

### *Recruitment and Retention*

In 1992, the University established the Office of New Student Relations to expand recruitment efforts at both the undergraduate and graduate levels. Targeted marketing strategies have been developed for selected markets, including in-state, out-of-state, nontraditional, minority, transfer, international, gifted, and graduate students. The recruitment base was extended from five counties to 54 counties within a 100-mile radius of YSU. The University is committed to a campus environment that values all individuals and groups and provides equal opportunities without regard to sex, race, religion, color, age, national origin, sexual orientation, handicap/disability, or identification as a disabled and/or Vietnam Era veteran. To underscore this commitment, a Task Force on Diversity is currently being formed to formulate recommendations to the administration. In addition, Disability Services delivers basic support services to persons with disabilities.

A variety of services are available to YSU students to facilitate their steady academic development. A Composition and Reading Placement Test and a Math Placement Exam are administered to each entering student to identify the need for any remedial coursework in English or Math. The Center for Student Progress is designed to intervene actively in the lives of students to help them achieve academic and social success in college. The Center houses the following services: Adult Learner Services; First Year Student Services; Student Tutorial Services; and Multicultural Student Services. Other resources available to students include the University Counseling Center, Disability Services, Student Health Clinic, The YSU Women's Center, The Writing Center, Mathematics Assistance Center, and the Reading and Study Skills Program. Through these services, students can find help and support to address virtually any problem they might encounter at YSU.

### *Internship and Co-op Opportunities*

Most YSU students learn job skills through employment during the course of their academic careers. This employment may take several forms - full-time or part-time; on-campus or off-campus; discipline-related or unrelated. Informal polls taken in engineering classes reveal that almost all full-time students work at least 20 hours per week. In many cases, students locate employment on their own. However, many discipline-related opportunities are identified by YSU's Office of Professional Practice & Cooperative Education (PPCE). These internship and co-op positions are monitored closely by the University, with feedback from both the student and the employer.

During the 1998-99 academic year, over 100 students in the target disciplines obtained internship positions through PPCE. In addition, the College of Engineering and Technology began offering an optional co-op program in 1998-99. During the first year of the program, 57 students participated in co-op or

internship experiences. Examples of employers include Consumers Water Co., Delphi-Packard Electric Systems, First Energy Corp., General Electric, General Motors, Goodyear, Honda of America, Ohio Department of Transportation, RMI Titanium Co., and U.S. Steel. In many cases, employers utilize the computer skills of students by assigning them to research and development problems that require innovation and challenge their creativity. In addition, the internship and co-op programs have provided an excellent opportunity for local companies to learn more about YSU and vice versa. Evaluation questionnaires show that the experiences of students and employers are overwhelmingly positive.

YSU has found internship and co-op experiences to be an essential component of a student's education and career preparation. The University is committed to expanding this program to provide opportunities for as many students as possible. Participants in the Technology Leaders Scholarship Program will be strongly encouraged to pursue internship and/or co-op experiences.

#### *Job Placement*

YSU's Office of Career Services provides comprehensive assistance to students in career planning and employment placement. The office maintains information on over 1,600 employers and updates postings of job openings daily. Job fairs and career days are held throughout the year. Professional staff members also conduct seminars on job search techniques, resume and letter writing, and interviewing. Several hundred corporations, businesses, schools, agencies, and governmental units visit the YSU campus each year to hold job interviews.

#### *Summary*

YSU has all of the capabilities required for successful implementation of a CSEMS project. The University offers academic programs in all of the disciplines and at all degree levels targeted by the CSEMS program. The environment combines a strong commitment to academic excellence and career development with an extensive student support infrastructure to promote academic progress and degree completion.

## **V. Project Description**

#### *Recruitment Plan*

The Technology Leaders Scholarship Program will be announced and advertised as widely as possible, both within the University and throughout the service area, in order to facilitate broad participation by eligible students. Databases available through the Office of Undergraduate Recruitment and Admissions and the Office of Institutional Research will be used to identify prospective scholarship candidates and generate mailing lists. Recruitment strategies include the following:

1. Associate Degree Candidates:
  - Letters will be sent to all high school science and mathematics teachers in the area asking them to announce the program to their students. Note that the required infrastructure is already in place (for example, letters were recently sent to this group of teachers regarding the YSU Women in Science Career Workshop for high school girls). Many area teachers already have connections with YSU through programs such as Upward Bound, the Lake-to-River Science Fair, Mathcounts, Challenge 24 Mathematics Competition, the Adopt-a-School Program, and the Summer of Growth workshops for professional development for primary and secondary school teachers.
  - Visits will be made to area high schools by recruiting personnel and personal phone calls will be made to eligible students. This infrastructure is also in place and will be handled through the Office of Undergraduate Recruitment and Admissions.

2. Bachelor Degree Candidates:
  - As the Technology Leaders Scholarship Program targets students who will complete their degree within two years, recruitment of Bachelor degree candidates will focus on students in their sophomore year. Letters will be sent to all YSU Pell-eligible sophomores with majors in computer science, engineering and mathematics.
  - Transfer students and students completing appropriate community college programs will also be eligible. YSU has articulation agreements with 15 community colleges in Ohio and western Pennsylvania.
3. Master Degree Candidates:
  - Letters will be sent to all students who have applied for admission to a graduate program in computer science, engineering, or mathematics and meet the Graduate Assistance in Areas of National Need criteria.
  - Recruitment will target both YSU students as well as graduating seniors from area colleges.
4. Web Page
  - A web page will be created to provide information about the Technology Leaders Scholarship Program, including eligibility criteria, application instructions, and phone and e-mail contacts for additional information.
  - As all high schools in the region are connected to the Internet, the web page will provide an easy way for these students to access information about the program.

In all recruiting efforts, a concerted effort will be made to encourage minorities, women, and students with disabilities to apply for scholarships. Communications with prospective applicants will attempt to dispel the myth that the target disciplines are too difficult or in any way exclusive. One way this might be accomplished is through a recruiting brochure containing testimonial statements from a diverse group alumni and/or current students.

#### *Selection Criteria*

Applicants to the Technology Leaders Scholarship Program must complete the following requirements by the application deadline of March 15:

- take the ACT or SAT (undergraduates), or GRE (graduate students);
- apply for admission to YSU;
- apply for federal financial aid through YSU Office of Financial Aid and be eligible for either the Pell Grant or the Graduate Assistance in Areas of National Need program;
- intend to enroll full-time in a program in computer science, engineering, engineering technology, or mathematics and complete their degree program within two years of their initial scholarship award;
- write a short essay explaining why they are interested in a technology career and outlining their educational goals, including proposed degree program and projected date of graduation;
- secure two letters of recommendation addressing the applicant's academic talent, ability to complete the proposed degree program successfully, and promise as member of the technology workforce.

The Technology Leaders Scholarship Program Selection Committee will be made up of the principal investigators and other representatives of the participating departments. The program will offer up to 40 awards annually of \$2,500 each for two years. It is expected that the distribution of awards among academic disciplines and degree levels might be roughly proportional to enrollment. Although no predetermined distribution will be set, the following minimum numbers of awards have been established as goals:

Degree Level: Associate - 5; Bachelor - 15; and Master - 5.

Discipline: Computer Science - 5; Engineering - 5; Engineering Technology - 5; Mathematics - 5.

This approach will allow the selection committee the flexibility to award scholarships to the most qualified students. The committee will announce the scholarship recipients by May 1. In making award decisions, the committee will use the general procedure described below.

First, applicants will be separated by degree level (Associate, Bachelor, and Master). Then, each group will be ranked by the applicable test score and/or grade point average – ACT and high school GPA for Associate degree candidates; college GPA for Bachelor degree candidates; and GRE and undergraduate GPA for Master degree candidates. The following tentative minimum criteria have been established for the awards: for entering freshmen – 23 ACT or top 20% of graduating class; for current undergraduates or incoming graduate students – undergraduate GPA of 3.2. Based on the initial rankings, a group of finalists will be selected in each degree category. Finally, student essays and letters of recommendation will be evaluated and combined with the test/grade rankings to make the final selection of award recipients. Other factors being roughly equal, preference will be given to minority, women, or disabled candidates.

### *Infrastructure and Retention Plan*

To promote the retention of participating students through degree completion, it is necessary to provide a challenging yet supportive academic environment and programs balancing a strong fundamental background with career preparation. The Technology Leaders Scholarship Program will implement a retention plan based on four key components – academic development; personal development; professional development; and mentoring. This plan will rely largely on existing programs and infrastructure at YSU.

The first step in the retention plan will be an orientation mixer for all participants, to be held during the first week of classes each semester, where students will meet each other and faculty (the PI's and others) from their programs. The goals of this mixer will be to build camaraderie and initiate the faculty mentoring process.

The academic development of participating students requires the availability of extra help with coursework when needed, strong academic programs with dedicated instructors, and exposure to exciting ideas in a wide range of disciplines. Existing YSU resources such as the Center for Student Progress, the Mathematics Assistance Center, and the Writing Lab provide help with study skills and tutoring in lower division courses. The PI's will monitor the progress of participating students through quarterly meetings and/or discussions with instructors and mentors. If necessary, arrangements will be made for appropriate academic help. In addition, opportunities will be provided for academic enrichment outside the classroom. Students will be encouraged to take advantage of such regular YSU programs as the Skeggs Lecture Series, Schermer Scholar in Residence Program, faculty forum presentations; exhibits and talks at the Butler Institute of American Art and the McDonough Museum of Art (both on the YSU campus), honors seminars, etc. Students in the Technology Leaders Scholarship Program will be placed on the mailing list for the YSU's honors program and will be invited to participate in all honors activities.

Personal development of students will be promoted through exposure to a diverse group of fellow students, faculty, and visiting scholars and professionals, as well as through mentoring and involvement in extracurricular activities. For example, students in the Technology Leaders Scholarship Program will be strongly encouraged to participate with YSU University Scholars and honors students in public service projects within the local community. Interaction with individuals from diverse backgrounds and participation in a wide variety of activities will help students to develop self-confidence, respect for diverse viewpoints, and a sense of belonging to the University and the region it serves.

The professional development of students in the program will be accomplished by means of internship and/or co-op experiences, participation in discipline-specific student societies (e.g., American Society of Civil Engineers; Society of Women Engineers; Pi Mu Epsilon), and mentoring by faculty. This will be augmented by preparation for post-graduation employment via the programs provided by Career Services.

Mentoring will take place at two levels. First, more advanced students will be encouraged to serve as mentors for incoming students or underclassmen. By involving students in activities with the University

Scholars and honors programs, they will have the chance to meet and develop mentoring relationships with some of YSU's top academic performers. In addition, the PI's and other faculty in the target disciplines will actively interact with students in the Technology Leaders Scholarship Program and take a personal interest in their academic, personal, and professional development.

The proposed project seeks to maintain a high level of student interest and satisfaction by providing a stimulating environment for academic, personal, and professional growth. Combining this with active monitoring and mentoring of students should optimize the chances that they will complete their degrees in a timely manner.

#### *Management and Administrative Plan*

The PI's will assume the responsibility of coordinating all aspects of the project implementation. All costs associated with management and administration of the project will be absorbed by YSU, so that 100% of NSF funding can be dedicated to student scholarships. Upon approval of the project, a specific timeline for all recruitment activities will be developed. Program needs will be communicated to the various YSU support offices, including Institutional Research and Assessment, Undergraduate Recruitment and Admissions, and Financial Aid and Scholarships. The PI's will work with the staff in these offices to identify, recruit, and qualify prospective candidates for the Technology Leaders Scholarship Program.

A Technology Leaders Scholarship Program Committee with representation from Computer Science, Engineering, Engineering Technology & Mathematics will be established and meet to select award winners based on criteria specified previously in this proposal. Letters of notification will be sent to all applicants by May 1 of each year. Award recipients will retain the scholarships for the entire two-year project period provided they maintain a cumulative GPA of 3.2. A pool of alternates will also be identified and ranked in the event that scholarship offers are not accepted or current participants become ineligible. At least 30 days before the start of each semester, the PI's will provide NSF with a list of award recipients.

At the beginning of each semester, the PI's will organize a mixer for participants in the program and assign each student to a faculty mentor. During weeks 5 and 6 of the semester, the PI's will survey the faculty mentors and/or participating students to identify any particular academic needs. A web site for the program will be maintained continuously by a student assistant in one of the participating departments.

At the end of each semester, the PI's will conduct a survey to solicit feedback from participating students on the quality of the program. The results will be compiled and evaluated and changes will be made where necessary to address deficiencies. An annual report will be prepared and sent to NSF at the end of each year of the project.

## **VI. Evaluation of Outcomes**

Several indicators will be used to evaluate the success of the Technology Leaders Scholarship Program, including the following:

- 1) Number of qualified applications received;
- 2) Numbers of applications received from minorities, women, and individuals with disabilities;
- 3) Number of participants graduating within two years of receiving awards;
- 4) Percentage of participating students maintaining a GPA of 3.2 or better;
- 5) Percentage of students participating in internship and/or co-op experiences;
- 6) Satisfaction rating on program evaluation survey; and
- 7) Percentage of participants accepting post-graduation employment in their field of study.

Each of these indicators provides a quantitative measure of program effectiveness. Other indicators may be added based on experience during the first year of the project. Each year, data will be compiled on all of these indicators. Where deficiencies are indicated, every effort will be made to correct the problems through modifications to the program.



The Technology Leaders Scholarship Program is viewed as a supplement to the highly successful University Scholars and Honors programs at YSU. The performance of students in the proposed program will be evaluated by comparison to the high standards achieved by these other programs. This will provide a challenging and rigorous measure of program success.

It is believed that the results of this project will provide useful insights into a variety of important issues in higher education, including recruitment/retention strategies and professional development in technical fields. The PI's will share significant findings with other educators through conference presentations and/or publications in appropriate journals.

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## Biographical Sketch

### James H. Mike, Ph.D.

Department of Chemistry  
Youngstown State University  
Youngstown, Ohio 44555

### EXPERIENCE

ASSOCIATE PROFESSOR, Dept. of Chemistry, Youngstown State University, Youngstown, Ohio (9/88 to present).

RESEARCH ASSOCIATE, Dept. of Biochemistry and Molecular Pathology, Northeastern Ohio Universities College of Medicine, Rootstown, Ohio (1/87 to 9/88).

LABORATORY DIRECTOR, JMI-Bowman Pharmaceuticals, Inc., Canton, OH (10/83 to 12/86).

GRADUATE TEACHING ASSISTANT, University of Cincinnati and Youngstown State University.

STAFF MEDICAL TECHNOLOGIST, Mount Carmel Medical Center, Columbus, Ohio (6/76 to 6/78).

### EDUCATION

Ph.D. -- University of Cincinnati, Cincinnati, Ohio (1980 to 1986).

- Dissertation: *"The Determination of Catecholamines in Biological Fluids Using Microbore Liquid Chromatography with Fluorescence Detection"*.
- Research project, directed by Prof. T.W. Gilbert.

M.S. -- Youngstown State University, Youngstown, Ohio (1978 to 1980).

- Thesis: *"Analysis of Some Transition Metals by High Pressure Liquid Chromatography"*.
- Research project, directed by Prof. F.W. Smith.

B.S. -- Youngstown State University, Youngstown, Ohio (1972 to 1976).

- Medical Technology major.

### PROFESSIONAL AFFILIATIONS

- American Chemical Society.
- Sigma Xi Honorary Research Society.
- Phi Kappa Phi Honor Society.

### GRADUATE THESIS COMMITTEES

Thesis Advisor (Completed Theses):

- M. Kathleen Leslie Cripe, *"Synthesis and Characterization of a t-Octylcalix[5]arene Derivatized Capillary Column for Gas Chromatography"* (1998).
- Rhonda S. Hirschl, *"Synthesis and Characterization of HPLC Stationary Phases Using 4-tert-Butylcalix[n]arenes"* (1998).
- Christian T. Lowe, *"Retention Characteristics of Water-Soluble Calixarene Modified Mobile Phases in HPLC"* (1998).
- Barbara Susan Saulitis, *"Solid-Phase Extraction of Aldosterone and Analysis Using Amperometric Detection"* (1996).
- Tatiana Trusova, *"Quantitative Estimation of Bile Acid Conjugates in Human Bile Using HPLC"* (1995).
- Rakesh Bose, *"Amperometric Detection of Aldosterone in High-Performance Liquid Chromatography with Copper(II)Bis-Phenanthroline"* (1995).
- Lisa Zeck, *"Optimization of an Immobilized Enzyme System for Conjugated Bile Acids"* (1995).
- Paul Bassett, *"Studies of Immobilized and Cross-linked  $\alpha$ -Chymotrypsin to Explore Solvent Stabilization"* (1995).
- Tamara Mowry, *"Post-Column Oxidation of Purpald<sup>0</sup>-Aldehyde Adducts at Nickel Oxide Electrodes"* (1995).
- Michael Patrick, *"Post-Column Electrochemical Reduction Reactor for Fluorescence Detection of Aldehydes Using High Performance Liquid Chromatography"* (1994).
- Rong Zhou, *"Determination of Fatty Acids By HPLC and Liquid-Liquid Extraction"* (1992).

- Xi Li , "*Determination of Conjugated Bile Acids Using HPLC and Immobilized Choloylglycine Hydrolase*", (1991).

Current active students at various stages: James Ronald Hefley and Michael Sullenberger.

Thesis Committee Member:

Maria K. Ferguson (1989); Janet R. Einfault (1989); Richard C. Williams (1990); Qing Hong (1995); Elizabeth Aigner (1996); Harry (Pete) Rook (1996); Beverly Smith-Pappa (1997); William Allen (1997).

### **PUBLISHED PAPERS**

1. "*Post-Column Oxidation of Purpald-Aldehyde Adducts at Nickel Electrodes*". T.M. Kerr and J.H. Mike, **Journal of Chromatography**, **1998**, 813, 213-222.
2. "*An Electrochemical Reactor for Post-Column Fluorescence Detection of Catecholamines by HPLC*.", J.H. Mike and B.L. Ramos, **Microchemical Journal**, **1993**, 47, 33-40.
3. "*Temperature Enhanced Chemiluminescence for Determination of Cholesterol*.", J.H. Mike and T.J. Cleland, **Analytica Chimica Acta**, **1992**, 259, 73-78.
4. "*Trace Metal Analysis Using Ion-Chromatography and Sequential ICP-AES*.", J.J. Giglio, J.H. Mike, and D.W. Mincey, **Analytica Chimica Acta**, **1991**, 254, 109-112.
5. "*Electrochemical Enhancement of High Performance Liquid Chromatography-UV Detection for Determination of Phenylpropanolamine*.", J.H. Mike, B.L Ramos, and T.A. Zupp, **Journal of Chromatography**, **1990**, 518(7), 167-177.

### **LIST OF PAST COLLABORATORS**

- Vincent Vanek, Department of Surgical Education, St. Elizabeths Medical Center, Youngstown Ohio.
- Jacques Gilloteaux, Department of Anatomy, Northeastern Ohio Universities College of Medicine, Rootstown, Ohio.

### **NAMES OF MENTORS**

- M.S. Thesis Advisor, Dr. F. W. Smith, Department of Chemistry, Youngstown State University, Youngstown, Ohio (deceased).
- Ph.D. Advisor. Dr. T. W. Gilbert, Department of Chemistry, University of Cincinnati, Cincinnati, Ohio (Retired).
- Postdoctoral Advisor. Dr. F. Hutterer, Department of Biochemistry and Molecular Pathology, Northeastern Ohio Universities College of Medicine, Rootstown, Ohio (Retired).

## Biographical Sketch

### **A. Curriculum vitae**

Robert W. Kramer  
Assistant Professor  
Department of Computer Science and Information Systems  
324 Meshel Hall  
Youngstown State University  
Youngstown, OH 44555  
330-742-1495  
E-mail: [kramer@cis.yzu.edu](mailto:kramer@cis.yzu.edu)  
WWW: <http://www.cis.yzu.edu/~kramer/index.html>

### Education

- Ph.D. in Computer Science, 1998, University of Pittsburgh, Pittsburgh, PA. Dissertation: "An Incremental Algorithm for Computing the Maximum Likelihood in Genetic Linkage Analysis"
- M.S. in Computer Science, 1991, University of Pittsburgh, Pittsburgh, PA.
- B.S. *summa cum laude* in Mathematics and Computer Science, 1987, Youngstown State University, Youngstown, OH.

### Academic Experience

- Assistant Professor, September 1998 - present, Department of Computer Science and Information Systems, Youngstown State University, Youngstown, OH.
- Instructor, January 1997 - June 1998, Department of Computer Science and Information Systems, Youngstown State University, Youngstown, OH.
- Research Assistant, 1994 - 1996, Department of Computer Science, University of Pittsburgh, Pittsburgh, PA.
- Teaching Fellow, 1992 - 1993, Department of Computer Science, University of Pittsburgh, Pittsburgh, PA.
- Teaching Assistant, 1989 - 1992, Department of Computer Science, University of Pittsburgh, Pittsburgh, PA.

### **B. Publications**

#### **Most Closely Related Publications**

none

#### **Other Publications**

1. Kramer, RW, Weeks, DE and Chiarulli, DM, "An Incremental Algorithm for Efficient Multipoint Linkage Analysis," *Human Heredity*, vol. 45(6), 1995.
2. R. Kramer, R. Gupta and M.L. Soffa, "The Combining DAG: A Technique for Parallel Data Flow Analysis," *IEEE Transactions on Parallel and Distributed Systems*, vol. 5, no. 8, August, 1994.
3. Robert W. Kramer, Rajiv Gupta and Mary Lou Soffa, "The Combining Dag: A Technique for Parallel Data Flow Analysis," *Proceedings of the 6th International Processing Symposium*, March, 1992.

**C. List of Collaborators**

Dr. Donald M. Chiarulli, University of Pittsburgh

Mr. Jeffrey R. O'Connell, University of Pittsburgh

Dr. Daniel E. Weeks, University of Pittsburgh

**D. Graduate Student Advising**

none

**E. Graduate Advisors**

M.S. - Dr. Mary Lou Soffa, University of Pittsburgh

Ph.D. – Dr. Donald M. Chiarulli, University of Pittsburgh

**BIOGRAPHICAL SKETCH**  
**SCOTT C. MARTIN, PH.D., P.E.**

**Position:** Professor, Department of Civil/Environmental & Chemical Engineering  
**Address:** Youngstown State University, Youngstown, OH 44555.

**Education:** Ph.D.: Clarkson University, Civil & Environmental Engineering (1984)  
M.S.: Clarkson University, Civil & Environmental Engineering (1979)  
B.S.: Clarkson University, Civil & Environmental Engineering (1977)

**Professional Registration:** Professional Engineer (P.E.) - Ohio

**Expertise:** Nutrient dynamics; eutrophication; water quality modeling; applications of GIS and GPS; pollutant-sediment interactions; aquatic chemistry; sustainable development.

**Honors and Awards:**

International Association for Great Lakes Research - Chandler-Meisener Award (1982)  
Youngstown State University - Distinguished Professor Award (1988, 1994, and 1997)  
Youngstown State University - Sabbatical Leave (1991-92)  
Engineer of the Year - Youngstown (OH) Branch of ASCE (1995)

**Selected Publications:**

- Martin, S.C., R.J. Ciotola, P. Malla, and S.N.G. Urs, 1998. Response of St. Albans Bay, Lake Champlain to a Reduction in Point Source Phosphorus Loading. Accepted for publication in American Geophysical Union monograph entitled *Lake Champlain: Research and Progress toward Management*.
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- Martin, S.C., J.V. DePinto, and T.C. Young, 1984. Biological Availability of Sediment Phosphorus Inputs to the Lower Great Lakes. USEPA Environmental Research Lab, Duluth, MN. EPA-600-03-84-100.

**Recent Collaborators (last two years):**

Richard Ciotola (Ohio Environmental Protection Agency)  
Robert Kramer (Youngstown State University)  
Prashant Malla (WELINK Consultants, Ltd.)  
James Mike (Youngstown State University)  
Bernadette Mullins (Youngstown State University)  
Subramanyaraje Urs (UBICS, Inc.)

**Graduate Students Advised (last five years):**

Arunachal Das (ICF Kaiser, Inc.)  
Ramakrishna Kaza (current affiliation unknown)  
Litong Li (current affiliation unknown)  
Radu Lungu (Remacor, Inc.)  
Robert Patterson (City Engineering Dept., Raleigh, NC)  
Richard Testa (Youngstown State University)  
Subramanyaraje Urs (UBICS, Inc.)

Total number of graduate students advised = 17

**Graduate Advisor:**

Joseph DePinto, SUNY University at Buffalo



**BIOGRAPHICAL SKETCH**  
**BERNADETTE MULLINS, PH.D.**

**Position:** Assistant Professor, Department of Mathematics and Statistics

**Address:** Youngstown State University, Youngstown, OH 44555.

**Education:** Ph.D.: University of Iowa, Mathematics (1995)

Dissertation: *Finiteness Theorems for Factorization in Integral Domains*

B.S.: Western Illinois University, Mathematics (1989)

**Honors and Awards:**

Outstanding Graduate Faculty Member in Mathematics, Youngstown State University, 1997.

Awarded Designation of Master Teacher, Youngstown State University, 1997

Outstanding Teaching Assistant Award, University of Iowa, 1991

**Recent Publications:**

J. Coykendall, D. Dobbs, and B. Mullins, *On Integral Domains with No Atoms*, submitted for publication.

D.D. Anderson and B. Mullins, 1997. *Quotients of Unit Groups of Commutative Rings*, Lecture Notes in Pure and Applied Mathematics, **185**:15-25.

D.D. Anderson and B. Mullins, 1996. *Finite Factorization Domains*, Proceedings of the American Mathematical Society, **124**:389-396.

**Recent Collaborators (last two years):**

D. Anderson (University of Iowa)

J. Coykendall (North Dakota State University)

D. Dobbs (University of Tennessee)

J. Mike (Youngstown State University)

S. Martin (Youngstown State University)

R. Kramer (Youngstown State University)

**Graduate Students Advised (last five years):**

A. Leone (Youngstown State University)

Total Number of Graduate Students Advised = 1

**Graduate Advisor:**

D. Anderson (University of Iowa)

# SUMMARY PROPOSAL BUDGET YEAR 1

ORGANIZATION <b>Youngstown State University</b>				FOR NSF USE ONLY			
				PROPOSAL NO.	DURATION (months)		
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR <b>James H Mike</b>				AWARD NO.	Proposed	Granted	
A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates (List each separately with title, A.7. show number in brackets)				NSF Funded Person-mos.		Funds Requested By proposer	Funds granted by NSF (if different)
	CAL	ACAD	SUMR				
1. <b>James H Mike - none</b>	0.00	0.00	0.00	\$ 0		\$ 0	
2. <b>Robert W Kramer - none</b>	0.00	0.00	0.00	0			
3. <b>Scott C Martin - none</b>	0.00	0.00	0.00	0			
4. <b>Bernadette Mullins - none</b>	0.00	0.00	0.00	0			
5.							
6. ( <b>0</b> ) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)	0.00	0.00	0.00	0			
7. ( <b>4</b> ) TOTAL SENIOR PERSONNEL (1 - 6)	0.00	0.00	0.00	0			
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)							
1. ( <b>0</b> ) POST DOCTORAL ASSOCIATES	0.00	0.00	0.00	0			
2. ( <b>0</b> ) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	0.00	0.00	0.00	0			
3. ( <b>0</b> ) GRADUATE STUDENTS				0			
4. ( <b>0</b> ) UNDERGRADUATE STUDENTS				0			
5. ( <b>0</b> ) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)				0			
6. ( <b>0</b> ) 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 \$ _____			<b>0</b>				
2. TRAVEL _____			<b>0</b>				
3. SUBSISTENCE _____			<b>0</b>				
4. OTHER _____			<b>0</b>				
TOTAL NUMBER OF PARTICIPANTS ( <b>0</b> )				TOTAL PARTICIPANT COSTS		<b>0</b>	
G. OTHER DIRECT COSTS							
1. MATERIALS AND SUPPLIES						<b>0</b>	
2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION						<b>0</b>	
3. CONSULTANT SERVICES						<b>0</b>	
4. COMPUTER SERVICES						<b>0</b>	
5. SUBAWARDS						<b>0</b>	
6. OTHER						<b>100,000</b>	
TOTAL OTHER DIRECT COSTS						<b>100,000</b>	
H. TOTAL DIRECT COSTS (A THROUGH G)						<b>100,000</b>	
I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) <b>% of MTDC (Rate: 0.0000, Base: 0)</b>							
TOTAL INDIRECT COSTS (F&A)						<b>0</b>	
J. TOTAL DIRECT AND INDIRECT COSTS (H + I)						<b>100,000</b>	
K. RESIDUAL FUNDS (IF FOR FURTHER SUPPORT OF CURRENT PROJECTS SEE GPG II.D.7.j.)						<b>0</b>	
L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)						\$ <b>100,000</b> \$	
M. COST SHARING PROPOSED LEVEL \$ <b>0</b>				AGREED LEVEL IF DIFFERENT \$			
PI / PD TYPED NAME & SIGNATURE*			DATE	FOR NSF USE ONLY			
<b>James H Mike</b>				INDIRECT COST RATE VERIFICATION			
ORG. REP. TYPED NAME & SIGNATURE*			DATE	Date Checked	Date Of Rate Sheet	Initials - ORG	

## SUMMARY PROPOSAL BUDGET COMMENTS - Year 1

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**\*\* G-6 Other**

**Student Scholarships**

**\*\* I- Indirect Costs**

**There are no indirect costs requested.**

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# SUMMARY PROPOSAL BUDGET YEAR 2

ORGANIZATION <b>Youngstown State University</b>				FOR NSF USE ONLY			
				PROPOSAL NO.	DURATION (months)		
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR <b>James H Mike</b>				AWARD NO.	Proposed	Granted	
A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates (List each separately with title, A.7. show number in brackets)				NSF Funded Person-mos.		Funds Requested By proposer	Funds granted by NSF (if different)
				CAL	ACAD	SUMR	
1.	<b>James H Mike - none</b>			0.00	0.00	0.00	\$ 0
2.	<b>Robert W Kramer - none</b>			0.00	0.00	0.00	0
3.	<b>Scott C Martin - none</b>			0.00	0.00	0.00	0
4.	<b>Bernadette Mullins - none</b>			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	0.00	0
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)							
1.	( 0 ) POST DOCTORAL ASSOCIATES			0.00	0.00	0.00	0
2.	( 0 ) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)			0.00	0.00	0.00	0
3.	( 0 ) GRADUATE STUDENTS						0
4.	( 0 ) UNDERGRADUATE STUDENTS						0
5.	( 0 ) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)						0
6.	( 0 ) OTHER						0
TOTAL SALARIES AND WAGES (A + B)							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	\$	0				
2.	TRAVEL		0				
3.	SUBSISTENCE		0				
4.	OTHER		0				
TOTAL NUMBER OF PARTICIPANTS ( 0 )				TOTAL PARTICIPANT COSTS			0
G. OTHER DIRECT COSTS							
1. MATERIALS AND SUPPLIES							0
2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION							0
3. CONSULTANT SERVICES							0
4. COMPUTER SERVICES							0
5. SUBAWARDS							0
6. OTHER							100,000
TOTAL OTHER DIRECT COSTS							100,000
H. TOTAL DIRECT COSTS (A THROUGH G)							100,000
I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE)							
<b>% of MTDC (Rate: 0.0000, Base: 0)</b>							
TOTAL INDIRECT COSTS (F&A)							0
J. TOTAL DIRECT AND INDIRECT COSTS (H + I)							100,000
K. RESIDUAL FUNDS (IF FOR FURTHER SUPPORT OF CURRENT PROJECTS SEE GPG II.D.7.j.)							0
L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)							\$ 100,000 \$
M. COST SHARING PROPOSED LEVEL \$ <b>0</b>				AGREED LEVEL IF DIFFERENT \$			
PI / PD TYPED NAME & SIGNATURE*			DATE	FOR NSF USE ONLY			
<b>James H Mike</b>				INDIRECT COST RATE VERIFICATION			
ORG. REP. TYPED NAME & SIGNATURE*			DATE	Date Checked	Date Of Rate Sheet	Initials - ORG	

## SUMMARY PROPOSAL BUDGET COMMENTS - Year 2

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**\*\* G- Total Other Direct Costs**

**Student Scholarships**

**\*\* I- Indirect Costs**

**There are no indirect costs requested.**

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# SUMMARY PROPOSAL BUDGET Cumulative

ORGANIZATION <b>Youngstown State University</b>				FOR NSF USE ONLY			
				PROPOSAL NO.	DURATION (months)		
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR <b>James H Mike</b>				AWARD NO.	Proposed	Granted	
A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates (List each separately with title, A.7. show number in brackets)				NSF Funded Person-mos.		Funds Requested By proposer	Funds granted by NSF (if different)
				CAL	ACAD	SUMR	
1.	<b>James H Mike - none</b>			0.00	0.00	0.00	\$ 0
2.	<b>Robert W Kramer - none</b>			0.00	0.00	0.00	0
3.	<b>Scott C Martin - none</b>			0.00	0.00	0.00	0
4.	<b>Bernadette Mullins - none</b>			0.00	0.00	0.00	0
5.							
6.	( ) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)			0.00	0.00	0.00	0
7.	( <b>4</b> ) TOTAL SENIOR PERSONNEL (1 - 6)			0.00	0.00	0.00	0
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)							
1.	( <b>0</b> ) POST DOCTORAL ASSOCIATES			0.00	0.00	0.00	0
2.	( <b>0</b> ) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)			0.00	0.00	0.00	0
3.	( <b>0</b> ) GRADUATE STUDENTS						0
4.	( <b>0</b> ) UNDERGRADUATE STUDENTS						0
5.	( <b>0</b> ) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)						0
6.	( <b>0</b> ) 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	\$	0				
2.	TRAVEL		0				
3.	SUBSISTENCE		0				
4.	OTHER		0				
TOTAL NUMBER OF PARTICIPANTS ( <b>0</b> )				TOTAL PARTICIPANT COSTS			0
G. OTHER DIRECT COSTS							
1. MATERIALS AND SUPPLIES							0
2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION							0
3. CONSULTANT SERVICES							0
4. COMPUTER SERVICES							0
5. SUBAWARDS							0
6. OTHER							200,000
TOTAL OTHER DIRECT COSTS							200,000
H. TOTAL DIRECT COSTS (A THROUGH G)							200,000
I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE)							
TOTAL INDIRECT COSTS (F&A)							0
J. TOTAL DIRECT AND INDIRECT COSTS (H + I)							200,000
K. RESIDUAL FUNDS (IF FOR FURTHER SUPPORT OF CURRENT PROJECTS SEE GPG II.D.7.j.)							0
L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)							\$ 200,000
M. COST SHARING PROPOSED LEVEL \$ <b>0</b>				AGREED LEVEL IF DIFFERENT \$			
PI / PD TYPED NAME & SIGNATURE*			DATE	FOR NSF USE ONLY			
<b>James H Mike</b>				INDIRECT COST RATE VERIFICATION			
ORG. REP. TYPED NAME & SIGNATURE*			DATE	Date Checked	Date Of Rate Sheet	Initials - ORG	

## Budget Justification Page

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**Because the nature of this grant coincides very closely with the mission and goals of Youngstown State University, the infrastructure for its administration is already in place. As a result, the administrative costs will be absorbed by YSU into existing systems. All resources requested from NSF will thus be allocated to student scholarships.**

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## Current and Pending Support

(See GPG Section II.D.8 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: <b>James Mike</b>	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: <b>Integration of Computer Technology into the General Chemistry Curriculum</b>	
Source of Support: <b>NSF</b> Total Award Amount: \$ <b>94,945</b> Total Award Period Covered: <b>07/01/00 - 07/01/02</b> Location of Project: <b>Youngstown State University; Department of Chemistry</b> Person-Months Per Year Committed to the Project.    Cal: <b>1.50</b> Acad: <b>0.00</b> Sumr: <b>1.50</b>	
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

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**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:**

**Clinical:**

**Animal:**

**Computer:**

**Office:**

**Other:** As discussed in the Project Description, various offices and services already present at Youngstown State University will be utilized for implementation of this project. Such facilities include (but are not necessarily limited to) the Office of Undergraduate Recruitment and Admissions, the Center for Student Progress, Office of Financial Aid and Scholarships, etc. Also, facilities within the University will be

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

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**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.

## FACILITIES, EQUIPMENT & OTHER RESOURCES

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Continuation Page:

### **OTHER FACILITIES (continued):**

**used for preparation of websites and advertisements and their associated costs will be absorbed by the University.**