

Supporting Statement for Paperwork Reduction Act Submissions

Section A. Justification

A1. Circumstances Making Information Collection Necessary

The United States depends on technological leadership to sustain economic growth and national security. It is thus essential to the Nation to assure the availability of well-trained scientists and engineers. Critical to providing this assurance is the need to encourage undergraduates to pursue graduate degrees in science, technology, engineering, and mathematics (STEM) and, subsequently, careers in those fields.

The creation of the National Institute of Biomedical Imaging and Bioengineering (NIBIB) within the National Institutes of Health (NIH) signaled recognition of the importance of bioengineering and the emerging field of bioinformatics to the Nation. Soon afterwards, the National Science Foundation (NSF) and NIBIB established a jointly run Bioengineering and Bioinformatics Summer Institute (BBSI) program aimed at beginning to create a supply of professionals trained in bioengineering and bioinformatics. This workforce initiative complements research in these fields funded by both agencies and constitutes a high profile effort to meet the anticipated bioengineering and bioinformatics human resource needs.

The purpose of this high value program is to provide students majoring in the biological sciences, computer sciences, engineering, mathematics, and physical sciences with well planned interdisciplinary bioengineering or bioinformatics research and education experiences in very active BBSIs, thereby increasing the number of young people considering careers in bioengineering and bioinformatics at the graduate level and beyond.

The first solicitation was in 2002, and 9 BBSIs began training students in 2003. Four additional BBSIs were selected in the 2006 competition. The study covers five years (2003–2007) for the 9 original BBSIs and one year (2007) for the 4 BBSIs selected in 2006. All faculty members and students who participated in the BBSI program from 2003 to 2007 will be surveyed. Declinees from both the 2002 and 2006 competitions will also be surveyed. There are three survey instruments: one for faculty participants, including principal investigators (PIs); one for former student participants; and one for proposers who did not receive a BBSI award. In addition, the PI of each BBSI will be asked to provide contact information for all faculty and student participants, and will be interviewed about matters related to running the program.

The BBSI program has in common with other NSF/NIH-sponsored student research programs an emphasis on hands-on research experience and an explicit concern about students' professional growth. The BBSI program, however, has some unique features: (1) an education (didactic) component in which students receive instruction through formal coursework; (2) a mix of undergraduate and graduate students; and (3) an option for students to participate for a second consecutive summer.

This study is the first effort to examine the activities and special features of the BBSI program and their implications for program outcomes.

A2. Purposes and Use of Information

The primary goal of this study is to learn whether BBSI is achieving its original objectives of providing students with interdisciplinary bioengineering/bioinformatics education and research experience, thereby increasing the number of young people considering careers in bioengineering and bioinformatics at the graduate level and beyond. The study seeks to obtain information on what educational and career decisions of students are affected by participation in a BBSI and what elements of the BBSI experience affect student outcomes. The study also seeks to learn the effects the BBSI program has on faculty participants and on the institutions

hosting a BBSI. Finally, the study seeks to document program-level outcomes and lessons learned from five years of operation, for the purpose of improving program design and implementation.

The study will be conducted primarily through Web surveys of (1) former BBSI students; (2) BBSI faculty (including PIs); and (3) declined proposers (non-awardees). Examples of information desired from each group include:

(1) Former BBSI Students:

- reasons for applying to a BBSI;
- activities in the BBSI experience;
- interactions with the faculty mentor;
- gains in knowledge and skills resulting from the BBSI experience (working independently, working collaboratively, substantive knowledge of bioengineering/bioinformatics, research tools and techniques, understanding how to design a research project and how to collect and analyze data to answer research questions);
- satisfaction with the BBSI experience;
- importance of the various BBSI components;
- interest in bioengineering/bioinformatics before and after the BBSI experience;
- degree expectations and career objectives before and after the BBSI experience;
- student outcomes (graduate school and jobs in bioengineering/bioinformatics-related field, authorship/co-authorship of papers published in peer-reviewed journals, network of professional colleagues and friends).

Gender and race/ethnicity of students will be used to determine the amount of diversity among BBSI students. Class year at time of BBSI experience and age at time of survey will put in perspective the post-BBSI status of students (enrollment status, degrees obtained, jobs).

(2) BBSI Faculty (including PIs):

Faculty will be asked corresponding questions about student activities, student/faculty mentor interactions, and student gains in knowledge and skills. The collection of gender and race/ethnicity will indicate the amount of diversity among BBSI faculty. In addition, the following information specific to faculty will be collected:

- reasons for participating in the BBSI program;
- criteria for selecting students for the BBSI program (if involved in selection);
- effects of the BBSI program on institution/department/program (helped in recruitment of highly qualified students, led to new graduate program in bioengineering/bioinformatics, led to increased or new interactions/collaborations, promoted interdisciplinary research, brought new recognition/prestige);
- effects of the BBSI program on oneself (redirected one's research, increased interdisciplinary research, increased interactions/collaborations with other faculty, increased visibility of one's academic activities, helped with promotion and/or tenure process).

(3) Declined Proposers (Non-Awardees)

- activities following declination (reapplied for BBSI funding, applied for different type of funding that would give undergraduates a research experience in bioengineering/bioinformatics, other activities that contribute to undergraduate research experiences in bioengineering/ bioinformatics, no further action);
- ways in which BBSI application process could be improved.

In addition, the PIs of the BBSIs will be interviewed about recruitment strategy and other matters related to running the program. The PIs of the 9 original BBSIs were interviewed in 2006 and 2007. The interviews were conducted over the telephone, except for the interviews with the PIs at Pennsylvania State University and Virginia Commonwealth University, which were conducted during site visits. The PIs of the 4 new BBSIs will be conducted in fall 2007.

A3. Use of Information Technology to Reduce Burden

Web-based questionnaires will be the primary data collection mode. A hard copy of the questionnaire will be sent to survey participants who do not have Internet access. Web surveying provides thorough editing as data are entered for completeness, validity, and consistency. Web-based surveys employ user-friendly features such as automated tabulation, data entry and error messages for easy online correction, standard menus, and, for analysis, predefined charts and graphics. All of these features facilitate the reporting process, provide useful and rapid feedback to the data providers, and reduce the cost of data collection.

A4. Efforts to Identify Duplication; Why Similar Information Cannot Be Used

This is the first time a study of the BBSI program has been conducted. For this reason and also because the BBSI program includes special features not included in other NSF programs, this study and the questionnaires do not duplicate information collected by other NSF efforts from the same respondents.

A5. Impact on Substantial Number of Small Businesses or Other Small Entities

No respondents are from small firms.

A6. Consequences of Not Collecting the Information

If the information is not collected, NSF will be unable to report on the results of the BBSI program and, thus, will be unable to meet accountability requirements. In addition, without this data collection it will not be possible to determine what, if anything, should be modified in the program's design and the types of activities, participants, and research setting to enhance program effectiveness.

A7. Special Circumstances that Require Information to be Conducted in a Manner Inconsistent with Guidelines in 5 CFR 1320.6

The data collections will comply with 5 CFR 1320.6.

A8. Consultation with Persons Outside the Agency

A notice of this study was published in the Federal Register on September 11, 2007 (72 FR 51848) and no substantial comments were received.

Information-gathering focus groups were held with faculty and students at two BBSI sites: Pennsylvania State University and Virginia Commonwealth University. A total of 9 faculty members and 9 students participated. The faculty comments were used to develop the faculty questionnaire, and the student comments were used to develop the student questionnaire.

Potential questionnaire topics were discussed with several individuals who are active in or familiar with the BBSI program. They reviewed the draft questionnaires, and their comments contributed to revisions to the instrument. Those consulted include:

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A9. Explanation of Payments or Gifts to Respondents

A \$20 gift certificate for a popular online retailer will be offered as incentive for students who complete the study questionnaire. A similar incentive was used in the initial and follow-up surveys to 2002 Undergraduate Research Opportunities (URO) student participants, which were conducted by SRI. The incentive proved highly effective in that 76% and 80% response rates, respectively, were obtained on those surveys.

A10. Assurances of Confidentiality

Respondents will be advised that any information on specific individuals will be maintained in accordance with the Privacy Act of 1974. Specifically, it has been policy in similar NSF studies conducted by SRI that only SRI staff have access to data from individuals. No data that can identify an individual will be provided to NSF or NIH staff in any form. Reports from this study will include only aggregate data so that no individual respondent or his/her organization can be identified. In the cover letter for the survey and on the questionnaire's cover sheet, respondents will see the project's confidentiality statement.

A11. Questions of a Sensitive Nature

No questions of a sensitive nature are included.

A12.1. Number of Respondents, Frequency of Response, and Annual Hour Burden

The study will be conducted primarily through three surveys of: (1) 167 faculty participants (including PIs) in the 13 BBSIs; (2) 523 student participants; (3) 49 proposers who did not receive a BBSI award.

The PIs of the 9 original BBSIs have already provided the names of their faculty and student participants for 2003–2006. These 9 PIs and the PIs of the 4 new BBSIs will be asked to provide the names of the 2007 faculty and student participants in September 2007.

The PIs of the 9 original BBSIs have been interviewed about recruitment strategies and other matters related to running the program. Two of these PIs were interviewed in person during site visits to Pennsylvania State University and Virginia Commonwealth University in fall 2006; the other 7 were interviewed by telephone in early 2007. The PIs of the 4 new BBSIs will be interviewed before the end of 2007.

The faculty survey will be sent to the 167 faculty participants (including PIs) in the 13 BBSIs. The student survey will be sent to the 523 student participants. The non-awardee survey will be sent to the 49 proposers who were declined in the 2002 and 2006 solicitations. Assuming a 75% response rate for each survey, 125 faculty participants, 392 student participants, and 37 declinees will respond to the relevant survey.

The PIs will respond three times: first, by providing the names of faculty and student participants; second, in an interview focused on recruitment strategy and other program matters about which only the PI has full knowledge; and third, in a survey of faculty participants. The former students, non-PI faculty participants, and the declined proposers will respond only once.

The estimate of burden per PI, based on previous similar surveys, is: 90 minutes for the PIs of the 9 original BBSIs to provide names and contact information for participants in 2003–07, and 30 minutes for the PIs of the 4 new BBSIs to provide the same information for 2007; 60 minutes for each PI to complete the PI interview; and 30 minutes for each PI to complete the faculty survey, for a total of 180 minutes for the PIs of the 9 original BBSIs and 120 minutes for the PIs of the 4 new BBSIs. The estimated burden per non-PI faculty participant and per student respondent, based on questionnaire pretests, is 30 minutes. The estimated burden per declined proposer, based on size of the questionnaire relative to size of the faculty survey, is 15 minutes. The total estimated response burden for the study, calculated by multiplying the number of respondents to each form by the burden per respondent for that form, is 385.75 hours. (See table in Section A12.2, below.)

A12.2. Hour Burden Estimates by Each Form and Aggregate Hour Burdens

There are five data collection forms: one contact information form; one PI interview protocol; and three survey questionnaires (one for BBSI faculty participants, one for BBSI student participants, and one for declined proposers). The table below shows the number of respondents for each type of form, the respondent burden for each individual per form, and the aggregate hour burden per form.

Study of BBSIs in 2003–07: Estimated Respondent Hour Burden			
Form Type	Number of Respondents	Burden Hours Per Respondent	Aggregate Hour Burden
BBSI participant contact information form (PIs of 9 original BBSIs, 2003–07) *	9	1.50	13.50
BBSI participant contact information form (PIs of 4 new BBSIs, 2007) *	4	0.50	2.00
PI interview protocol *	13	1.00	13.00
Faculty questionnaire (incl. PIs)	167	0.50	83.50

*			
Student questionnaire	523	0.50	261.50
Non-awardee questionnaire	49	0.25	12.25
TOTAL	765	--	385.75

* The 13 PIs are counted three times: once for contact information; once for interview; and once for faculty questionnaire.

A12.3. Estimates of Respondent Cost Burden

The overall cost to the respondents for the study is estimated to be \$5,456.08. The estimated hourly wage rates for PIs and faculty mentors are based on 2005–06 faculty salary data from the Department of Education's National Center for Educational Statistics Integrated Postsecondary Education Data System, published in *The Condition of Education*, Table 44-1a (<http://nces.ed.gov/programs/coe/2007/section5/table.asp?tableID=743>). The estimated hourly wage rates for students are based on minimum wage information (increase effective July 2007) from the U.S. Department of Labor (<http://www.dol.gov/dol/topic/wages/minimumwage.htm>).

Study of BBSIs in 2003–07: Estimated Respondent Cost Burden

Form Type	Number of Respondents	Burden Hours Per Respondent	Estimated Hourly Rate	Estimated Respondent Cost
BBSI participant contact information form (PIs of 9 original BBSIs, 2003–07) *	9	1.50	\$31.60	\$426.60
BBSI participant contact information form (PIs of 4 new BBSIs, 2007) *	4	0.50	\$31.60	\$63.20
PI interview protocol *	13	1.00	\$31.60	\$410.80
Faculty questionnaire (incl. PIs) *	167	0.50	\$31.60	\$2,638.60
Student questionnaire	523	0.50	\$5.85	\$1,529.78
Non-awardee questionnaire	49	0.25	\$31.60	\$387.10
TOTAL	765	--	--	\$5,456.08

* The 13 PIs are counted three times: once for contact information; once for interview; and once for faculty questionnaire.

A13. Estimate of Total Capital and Startup Costs/Operation and Maintenance Costs to Respondents or Record Keepers

There is no overall annual cost burden to the BBSI principal investigators, other faculty participants, and student participants other than the time spent completing the BBSI participant contact information form, the PI interview (see Appendix B), and the questionnaires (see Appendix C).

A14. Estimates of Costs to the Federal Government

The estimated cost to the government of all data collection, analysis, and reporting activities for this study is \$262,128 over 2 years [modify for BBSI] (Base Contract Number: GS10F0554N). In addition, an estimated 2 months of NSF staff time will be expended during the study. Using an average \$55 hourly rate covering administrative, program manager, and COTR time, the estimated cost of NSF personnel effort is \$17,600.

The estimated costs include:

Study of BBSIs in 2003–07: Estimated Cost to Federal Government

<u>Contractor Costs</u>	
Personnel	\$251,848
<u>Other Direct Costs</u>	
Materials and Services	\$ 6,600
Staff Travel & Per Diem	\$ 1,186
Support cost burden	\$ 326
G & A on support costs	\$ 2,169
<u>Total Contractor Costs</u>	\$262,128
<u>NSF Costs</u>	
Personnel	\$ 17,600
Incentives (\$20 per student) *	\$ 10,460
<u>Total NSF Costs (not contracted to SRI)</u>	\$ 18,060
<u>Total, All Costs</u>	\$262,128

* Reflects \$20 incentive for universe of students (523). Assuming a 75% response to the survey, an estimated 392 students would receive the incentive for completing the survey, totaling \$7,840 instead of the \$10,460 shown above.

A15. Change in Burden

There is no change in burden.

A16. Plans for Publication, Analysis and Schedule

Time Schedule for Study:

October 2006 to October 2007

- Prepare study design
- Interview PIs
- Develop questionnaires
- Submit package to OMB
- Pre-test questionnaires

November 2007 to July 2008

- Receive OMB clearance
- Conduct surveys
- Analyze survey data

- Prepare draft and final reports (technical and summary)

There will be no complex analytical techniques used, such as imputation and sampling.

A17. Approval to Not Display Expiration Date

Not applicable

A18. Exceptions to Item 19 of OMB Form 83-1

No exceptions apply.