

INTEGRATIVE GRADUATE EDUCATION AND RESEARCH TRAINEESHIP (IGERT) PROGRAM

Program Solicitation

NSF 02-145

DEADLINE DATES:

Preproposals (Required): October 2, 2002

Full Proposals (Invited): April 18, 2003

DIRECTORATES FOR:

BIOLOGICAL SCIENCES

COMPUTER AND INFORMATION SCIENCE AND ENGINEERING

EDUCATION AND HUMAN RESOURCES

ENGINEERING

GEOSCIENCES

MATHEMATICAL AND PHYSICAL SCIENCES

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SUMMARY OF PROGRAM REQUIREMENTS

GENERAL INFORMATION

Program Title:

Integrative Graduate Education and Research Traineeship (IGERT) Program

Synopsis of Program:

The IGERT program continues into its sixth annual competition. Proposals for new IGERT projects as well as proposals based on existing IGERT projects may be submitted. The IGERT program has been developed to meet the challenges of educating U.S. Ph.D. scientists, engineers, and educators with the interdisciplinary backgrounds, deep knowledge in chosen disciplines, and technical, professional, and personal skills to become in their own careers the leaders and creative agents for change. The program is intended to catalyze a cultural change in graduate education, for students, faculty, and institutions, by establishing innovative new models for graduate education and training in a fertile environment for collaborative research that transcends traditional disciplinary boundaries. It is also intended to facilitate greater diversity in student participation and preparation, and to contribute to the development of a diverse, globally-engaged science and engineering workforce.

Cognizant Program Officers:

- IGERT Coordinating Committee members, listed in the program solicitation.

Applicable Catalog of Federal Domestic Assistance (CFDA) Number:

- 47.074 --- (BIO)
- 47.070 --- (CISE)
- 47.076 --- (EHR)
- 47.041 --- (ENG)
- 47.050 --- (GEO)
- 47.049 --- (MPS)
- 47.075 --- (SBE)
- 47.078 --- (OPP)

ELIGIBILITY INFORMATION

- **Organization Limit:** Academic institutions in the United States and its territories that grant the Ph.D. degree in the sciences and engineering may submit proposals. Non-Ph.D. granting, nonacademic, and international institutions may serve as collaborating institutions.
- **PI Eligibility Limit:** None
- **Limit on Number of Preproposals:** None
- **Limit on Number of Full Proposals:** Invitation to submit a full proposal is based on merit review of the preproposal. An institution may submit no more than two single-institution full proposals and, as lead institution, one multi-institution full proposal.

AWARD INFORMATION

- **Type of Award:** Continuing Grant
- **Estimated Number of Awards:** Approximately 20 awards, depending upon the quality of proposals and availability of funds.
- **Anticipated Funding Amount:** Up to \$2.95M per award over 5 years. Additional funding of international activities for some awards of up to \$500K per award over 5 years.

PROPOSAL PREPARATION AND SUBMISSION INSTRUCTIONS

A. Proposal Preparation Guidelines

- **Proposal Preparation Instructions:** The program contains deviations from the standard *Grant Proposal Guide (GPG)* proposal preparation guidelines. Please see the program solicitation for further information.

B. Budgetary Information

- **Cost Sharing Requirements:** None
- **Indirect Cost (F&A) Limitations:** 8% of total direct cost, excluding equipment and cost-of-education allowances.
Other Budgetary Limitations: Graduate student stipend allowance is currently \$21,500 per year per student. NSF is seeking to raise graduate stipends to \$25,000, in which case additional project funding will be provided. All graduate and other stipend recipients must be citizens or permanent residents of the U.S. or its possessions.

C. Deadline Dates

- **Preproposal (Required):** October 2, 2002
- **Full Proposal (Invited):** April 18, 2003

D. FastLane Requirements

- **FastLane Submission:** Required.
- **FastLane Contact:**
 - FastLane User Support, at 1-800-673-6188, or fastlane@nsf.gov.

PROPOSAL REVIEW INFORMATION

- **Merit Review Criteria:** National Science Board approved criteria. Additional merit review considerations apply. Please see the program solicitation for further information.

AWARD ADMINISTRATION INFORMATION

- **Award Conditions:** Standard NSF award conditions apply.
- **Reporting Requirements:** Additional reporting requirements apply. Please see the program solicitation for further information.

I. INTRODUCTION

The National Science Foundation continues the Integrative Graduate Education and Research Traineeship (IGERT) program into its sixth annual competition. The IGERT program has been developed to meet the challenges of educating U.S. Ph.D. scientists, engineers, and educators with the interdisciplinary backgrounds, deep knowledge in chosen disciplines, and technical, professional, and personal skills to become in their own careers the leaders and creative agents for change. The program is intended to catalyze a cultural change in graduate education, for students, faculty, and institutions, by establishing innovative new models for graduate education and training in a fertile environment for collaborative research that transcends traditional disciplinary boundaries. It is also intended to facilitate greater diversity in student participation and preparation, and to contribute to the development of a diverse, globally-engaged science and engineering workforce.

IGERT is an NSF-wide endeavor involving the Directorates for Biological Sciences (BIO), Computer and Information Science and Engineering (CISE), Education and Human Resources (EHR), Engineering (ENG), Geosciences (GEO), Mathematical and Physical Sciences (MPS), Social, Behavioral, and Economic Sciences (SBE), the Office of Polar Programs (OPP), and the Office of International Science and Engineering (INT).

II. PROGRAM DESCRIPTION

Proposals submitted to the IGERT program must be innovative research-based graduate education and training activities in emerging areas of science and engineering. They must be organized around an interdisciplinary research theme and involve a diverse group of faculty members and other investigators with appropriate expertise in research and teaching. The interdisciplinary theme provides a framework for integrating research and education and for promoting collaborative efforts within and across departments and institutions. Students should gain the breadth of skills, strengths, and understanding to work in an interdisciplinary environment while being well grounded with depth of knowledge in major fields. The IGERT project should provide students experience relevant to both academic and nonacademic careers by linking graduate research and education through such activities as internships and mentoring in industrial, national laboratory, academic, or other settings. Globalization of research and career opportunities places importance on providing students an international perspective, such as through internships, fieldwork, or other experiences abroad appropriate to the research area. The graduate experience should contribute to the professional and personal development of the students and equip them to understand and integrate scientific, technical, business, social, and ethical issues to confront the challenging problems of the future.

The interdisciplinary research theme may draw upon investigators from one or more academic departments within a single institution or from more than one institution. The primary emphasis of the IGERT program is on innovative approaches to education and training of doctoral students. Participation of individuals at the undergraduate, masters and postdoctoral levels may be included if such participation clearly strengthens the doctoral program. All stipend recipients supported by IGERT funds must be citizens or permanent residents of the U.S. or its possessions. However, participation by individuals who are supported with other funds is encouraged. In contributing to a diverse science and engineering workforce for the future, the IGERT project should include strategies for recruitment, mentoring, and retention aimed at members of groups underrepresented in science and engineering, i.e., women, racial and ethnic minorities, and persons with disabilities.

Features of IGERT Projects

IGERT projects are expected to incorporate the following features:

- A comprehensive interdisciplinary theme, appropriate for doctoral-level research, that serves as the foundation for traineeship activities;
- Integration of the interdisciplinary research with innovative graduate education and training mechanisms, curricula enhancement, and other educational features that foster strong interactions among participating students and faculty;
- An environment that exposes students to a broad base of state-of-the-art research and educational tools and methodologies;
- Provision for developing professional and personal skills, such as communication, teamwork, teaching, mentoring, and leadership;
- Opportunities for career development, such as may be provided by internships and mentoring in industrial, national laboratory, academic, non-U.S. institutions, or other settings;
- Integrated instruction in ethics and the responsible conduct of research;
- Fostering of an international perspective;
- Institutional strategy and operational plan for recruitment, mentoring, and retention of U.S. graduate students, including efforts aimed at members of groups underrepresented in science and engineering;
- Strategy and methodology for formative and summative assessments of project performance via individuals internal and external to the institution;
- Administrative plan and organizational structure that ensures effective management of the project resources; and
- Institutional commitment to furthering the plans and goals of the IGERT project and to creating a supportive environment for integrative research and education.

Principal Investigator

The Principal Investigator (PI) shall be the director of the IGERT project, and is expected to be an essential participant in its educational and research activities. The PI will have overall responsibility for administration of the award, management of the project, and interactions with the NSF.

Two-Stage IGERT Competition

Applicants for IGERT projects compete in a two-stage process. In the first stage, all applicants submit a preliminary proposal (preproposal) that outlines the planned IGERT project. In the second stage, based on panel review of the preproposals, successful applicants will be invited to submit full proposals. Only those applicants invited to submit full proposals may do so, consistent with the institutional limitations discussed in Eligibility, Section III, below.

III. ELIGIBILITY

Academic institutions in the United States and its territories that grant the Ph.D. degree in the sciences and engineering are invited to apply. Projects may involve more than one institution, but a single institution must accept overall management responsibility. Non-Ph.D. granting, nonacademic, and non-U.S. institutions may serve as collaborating institutions.

Proposals for new IGERT projects as well as proposals based on existing IGERT projects may be submitted. Projects involving research in any of the areas appropriate for funding by NSF are eligible. To encourage the development of innovative projects, there is no limit to the number of preproposals that may be submitted by an institution in response to this solicitation. However, at the full proposal stage, institutions will be limited to submission of at most two single-institution full proposals and, as lead institution, one multi-institution full proposal.

IV. AWARD INFORMATION

Awards for IGERT projects will be made in amounts up to \$550,000 per year for a duration of five years. Projects requiring substantially lower levels of funding may also be proposed. Additional funds of up to \$200,000 may be provided in the first year for purposes appropriate to the IGERT project, including shared research equipment, special-purpose research materials, software, and databases, and faculty release time for development of new curricula. Additional funds of up to \$100,000 per year for five years may be provided for some awards to support international activities that will significantly enhance the research, education, and training experiences of the IGERT graduate students. NSF plans to make approximately 20 awards from this competition, depending on the quality of the proposals and the availability of funds.

V. PROPOSAL PREPARATION AND SUBMISSION INSTRUCTIONS

A. Proposal Preparation Instructions

Proposals should be prepared in accordance with the general guidelines contained in the NSF [Grant Proposal Guide](#) (GPG), with exception of deviations given in the specific IGERT instructions below. The complete text of the GPG is available electronically on the NSF Web Site at: <http://www.nsf.gov/cgi-bin/getpub?gpg>. Paper copies of the GPG may be obtained from the NSF Publications Clearinghouse, telephone (301) 947-2722 or by e-mail from pubs@nsf.gov.

PREPROPOSAL CONTENT

Preproposals must contain the items listed below and adhere to the specified page limitations. No additional information may be provided by links to web pages, and font size must be at least 10 point. At the preproposal stage, no letters of commitment or endorsement from the submitting institution or other organizations may be submitted.

Cover Sheet: Select the program solicitation number, NSF 02-145, from the pull down list, and then select IGERT Preproposal for the program unit from the ensuing screen. An informative title for the proposed IGERT project, that begins with "IGERT: ", must be provided. Check the box indicated for preproposal. The principal investigator and at most four co-principal investigators can be designated. Additional lead personnel should be included in the List of Participants, Section (C) a, below.

(A) Project Summary (1-page limit): Provide a summary description of the IGERT project, including its research theme and key education and training features, in a manner that will be informative to a general technical audience. The project summary must explicitly address the intellectual merit and broader impacts of the proposed activity. At the top of this page include the title of the IGERT project, the name of the principal investigator, and the lead institution. Also list any other participating institutions.

(B) Table of Contents: The Table of Contents is generated by FastLane and cannot be edited.

(C) Project Description: The project description contains the following items a through g, which are limited to a combined total length of 7 pages, inclusive of tables, figures, or other graphical data.

- a. **List of Participants** (1-page limit): Include departmental and institutional affiliation of all faculty members and other senior level personnel expected to have an important role in the project.
- b. **Vision, Goals, and Thematic Basis:** Describe the vision, goals, and anticipated impact of the proposed IGERT project. Describe the thematic basis and unifying aspects of the interdisciplinary research and educational activities to be offered. Include a discussion of what is currently missing from graduate education and training or what could be done more effectively, and how the proposed project will address these issues. Summarize the value-added aspects of the proposed project, and be specific about what is new and innovative.
- c. **Major Research Efforts:** Describe the major research efforts that are intended to serve as the foundation of the IGERT project. Emphasize their cutting-edge aspects and how they are interwoven and integrated to form the thematic basis for the interdisciplinary project. They should be described in sufficient detail for reviewers to assess their scientific merit and relevance to the project theme. If an international component is included, describe how it is to be grounded in the core research, education, and training activities of the IGERT project.
- d. **Education and Training:** Describe the graduate education and training mechanisms that are central to the IGERT project, and how they are to be integrated with the research. Novel aspects should be emphasized to enable assessment of their innovation and potential impact. Discuss career development opportunities and provision for developing professional and personal skills, an international perspective, and integrated instruction in ethics and the responsible conduct of research.
- e. **Management, Assessment, and Institutional Commitment:** Describe the strategies for management of the IGERT project, for formative and summative assessment of the project's effectiveness in its impact on students and faculty, and the commitment that the institution will make to furthering project plans and goals and to creating a supportive environment for interdisciplinary research and education. Indicate how diversity will be promoted as an integral part of the project.
- f. **Expected Resource Commitments:** Describe anticipated resource commitments to the IGERT project by other organizations expected to participate, such as industry, government, non-U.S. institutions, and private foundations. Applicants proposing international activities may wish to consult the INT member of the IGERT Coordinating Committee, listed in Section VIII, Contacts.
- g. **Recent Traineeship Experience and Results from Prior NSF Support (if applicable):** Describe your experience with and outcomes of any related graduate traineeship project during the past five years. In this description, address not only the outcomes of the prior project, but also, in a comparative manner, describe the value-added aspects of the proposed IGERT project.

(D) References Cited (1-page limit)

(E) Biographical Sketches and Current Research Support (1-page limit per participant; a maximum of 20 biographical sketches may be included): For participants listed in Section (C) a, above, provide a biographical sketch that also includes a brief description of current research support. The sketch should include the individual's academic and professional history, and may include a list of the five most significant publications. Other activities or accomplishments may be listed. In choosing what to include, emphasize information that will be helpful in understanding the strengths, qualifications, and specific impact the individual brings to the IGERT project.

(F) Estimated Five-Year Budget Summary (NSF Form 1030): Prepare a one page, five-year summary of total estimated expenses. Budgets should emphasize graduate student support. Within FastLane, enter your five-year summary budget as Year 1, and FastLane will create the cumulative budget automatically.

Budget Justification (1-page limit): Provide a discussion of the proposed allocation of funds in the major budget categories of Section (F), above, with sufficient clarity to show how resources will be utilized in carrying out the planned IGERT project activities.

FULL PROPOSAL CONTENT

Only those applicants invited to submit full proposals may do so. Full proposals must contain the items listed below and adhere to the specified page limitations. No additional information may be provided by links to web pages, and font size must be at least 10 point.

Cover Sheet: Select the program solicitation number, NSF 02-145, from the pull down list, and then select IGERT Full Proposal for the program unit from the ensuing screen. An informative title for the proposed IGERT project, that begins with "IGERT: ", must be provided. Enter the related preproposal number in the appropriate box. You may list a starting date of October 1, 2003.

(A) Project Summary (1-page limit): Provide a summary description of the IGERT project, including its research theme and key education and training features, in a manner that will be informative to a general technical audience. The project summary must explicitly address the intellectual merit and broader impacts of the proposed activity. At the top of this page include the title of the IGERT project, the name of the principal investigator, and the lead institution. Also list any other participating institutions.

(B) Table of Contents: The Table of Contents is generated by FastLane and cannot be edited.

(C) Project Description: The project description section contains the following items a through j. Items a through h are limited to a combined total length of 25 pages, inclusive of tables, figures, or other graphical data. The research and education discussions in items c and d should be balanced in length.

- a. **List of Participants** (1-page limit): Include departmental and institutional affiliation of all faculty members and other senior level personnel expected to have an important role in the project.
- b. **Vision, Goals, and Thematic Basis:** Discuss the vision, goals, and broader impacts of the proposed IGERT project. Describe the thematic basis and unifying aspects of the interdisciplinary research and educational activities to be offered. Include a discussion of what is currently missing from graduate education and training or what could be done more effectively, and how the proposed project will address these issues. Benefits to be realized from opportunities for interdisciplinary collaboration in research and education should be emphasized. Summarize the value-added aspects of the proposed project, and be specific about what is new and innovative.

- c. **Major Research Efforts:** Describe the major research efforts that are intended to serve as the foundation of the IGERT project. Emphasize both their cutting-edge aspects and how they are interwoven and integrated to form the thematic basis for the interdisciplinary project. For each research area described, specify the faculty members and other principals involved, and provide sufficient detail to enable assessment of the scientific merit and relevance to the project theme. Needs for special materials, shared instruments, travel to research sites, or interdisciplinary curriculum must be justified in the context of the research theme and breadth of challenges involved. If an international component is included, describe how it is to be grounded in the core research, education, and training activities of the IGERT project.
- d. **Education and Training:** Describe the graduate education and training mechanisms that are central to the IGERT project, and how they are to be integrated with the research. Novel aspects should be emphasized to enable assessment of the innovation and potential impact. Specify faculty members and other participants with primary responsibility for these integrative efforts. Discuss career development opportunities and provision for developing professional and personal skills, an international perspective, and integrated instruction in ethics and the responsible conduct of research. If planned student training includes internships, fieldwork, or other opportunities, domestic and foreign, identify the potential mentors and discuss how the opportunity is intended to strengthen both a student's graduate experience and the IGERT project. Show typical student pathways through the program and the effect on expected time to degree. Elaborate the role of diversity as an integral part of the program. The role of undergraduate, masters, and postdoctoral components, if proposed, must also be described with sufficient detail to clarify the benefit to the doctoral program and to justify support through this type of award.
- e. **Organization, Management, and Institutional Commitment:** Describe plans and procedures for the organization and management of the IGERT project. The plans should be specific and include use of a formal mechanism that assures the fair and effective allocation of IGERT resources and enables faculty members, students, and others to interact effectively in furthering project goals. Describe the commitment of the institution at all appropriate administrative levels to furthering project plans and goals and creating a supportive environment for integrative research and education. A supporting letter of commitment from the senior administration of the submitting institution must accompany this proposal, in Section I, Supplementary Documentation. Should a multi-institution project be proposed, then provide a careful justification that considers the administrative complexity and the expected benefits to student experiences. Discuss the role of other academic institutions or organizations such as industry, government, non-U.S. institutions, or private foundations that are expected to participate in the IGERT project. Procedures for selecting students and others who will receive stipends or otherwise share in group funds must be described, as well as plans for staging new students into the program, the duration of their support with IGERT funds, and provisions for continued support through the completion of degree. Discuss plans for sustaining the key features of the IGERT project after NSF funding is completed.
- f. **Performance Assessment:** Describe a performance plan and methodology that relates the goals of the IGERT project, as it impacts students and faculty, to indicators and specific measurements for formative and summative assessment of progress toward goal achievement. The assessment should involve evaluators internal and external to the institution who can render an objective evaluation and whose expertise spans the education and research objectives of the IGERT project.

- g. **Recruitment, Mentoring, and Retention:** Describe plans for recruitment, mentoring, and retention of U.S. graduate students, including specific provisions aimed at members of groups underrepresented in science and engineering. Describe the diversity makeup of faculty participating in the IGERT project. If applicable, discuss how undergraduate student participation will be used to further the goals of attracting members of underrepresented groups. Specify the Ph.D. program or programs in which the IGERT graduate students may enroll.
- h. **Recent Traineeship Experience and Results from Prior NSF Support** (if applicable): Describe your experience with and outcomes of any related graduate traineeship project during the past five years. In this description, address not only the outcomes of the prior project, but also, in a comparative manner, describe the value-added aspects of the proposed IGERT project. Value-added aspects may include: New areas of research; New educational paradigms for students, faculty, and institution; Vertical and lateral cultural impact on faculty, institution, and even outside your institution; and Recruitment, mentoring, retention, and career paths of U.S. graduate students, including those from underrepresented groups. Further, describe the role and commitment that the institution's administration has had and will have in furthering traineeship project plans and goals. This section may not exceed 5 pages in length, within the overall 25-page limit for project description.
- i. **International Coordination** (if applicable; 2-page limit): Describe the procedures and arrangements for selecting, preparing, and sending IGERT students to foreign sites for research and education collaboration, including how their activities abroad will be integrated into and benefit the overall IGERT program. Discuss how specific projects will be determined for individual students and how effective mentoring will be ensured in the foreign host institutions. Address the practical aspects of sending U.S. students abroad, including logistical arrangements, language and cultural issues, and administrative requirements.
- j. **Recruitment and Retention History** (1 page per participating department/program): Explain your capacity to host an IGERT project, and past performance and ability to attract well-qualified U.S. graduate students in science and engineering, including those from underrepresented groups. Provide the following information, over the last three years, regarding recruitment and retention of students in the participating departments/programs: (1) total number of applicants, (2) total number of applicants accepted, (3) total number of applicants who enrolled, (4) total number of students currently enrolled in the program indicating part-time and full-time status, (5) total number of Ph.D.s awarded, (6) average time to degree, and (7) other relevant measures of student success. In addition, provide separate data for women, underrepresented minorities, and persons with disabilities for each of the above categories. A tabular format should be used with separate tables for each participating department/program.

(D) References Cited (3-page limit)

(E) Biographical Sketches and Current Research Support (2-page limit each for PI and co-PIs; 1-page limit each for other participants; a maximum of 20 biographical sketches may be included, with up to 5 additional sketches when international activities are proposed): For participants listed in Section (C) a, above, provide a biographical sketch that also includes a brief description of current research support. The sketch should include the individual's academic and professional history, and may include a list of the five most significant publications. Other activities or accomplishments may be listed. In choosing what to include, emphasize information that will be helpful for understanding the strengths, qualifications, and specific impact the individual brings to the IGERT project.

(F) Budget and Allowable Costs (NSF Form 1030): Provide a budget for each year of support requested, not to exceed \$550,000 per year for 5 years, with the exception that (a) the first-year budget may include up to an additional \$200,000 special allocation for purposes discussed below, and (b) up to an additional \$100,000 per year for 5 years may be requested for international activities discussed below. The FastLane system will automatically fill out the cumulative 5-year budget for the proposal. Awarded funds not expended in the specific year requested may be carried over with appropriate justification provided in the annual report to NSF. The major portion of funds must be used for doctoral student stipends, educational and training activities, and for related expenditures, such as student travel, publication costs, and recruitment. A limited amount of funds may be budgeted for administrative support, support of short-term visitors, and to partially defray the costs of research by students. No funds for faculty research or salaries will be provided, with the following exceptions: (a) one month per year of salary support for the Principal Investigator for management purposes; (b) up to 4 months total of faculty salary support for development of IGERT curricula. The faculty salary support for development of curricula should be requested from within the first-year special allocation; however, its expenditure may be extended over the first two years of IGERT project activity.

Additional funds requested for international activities should be appropriate to enable the unique benefits expected for the IGERT graduate students and the IGERT project. The primary support is intended for graduate students through internships (university, government, industry), fieldwork with foreign collaborators, or in other settings abroad appropriate to the research area. The stays should be of sufficient duration to acculturate the student and provide a meaningful research and education experience. Limited funds may also be used for student preparation, administration of the international activities, and faculty visits to foreign sites for research coordination and developing communication linkages between institutions. Requests for travel funds for the sole purpose of attending international conferences or workshops are not appropriate. Reciprocal visits by foreign researchers and students to the U.S. institutions are encouraged, although NSF funds will normally not be used for such visits. Applicants should consult the INT member of the IGERT Coordinating Committee, listed in Section VIII, Contacts.

The NSF contribution to graduate student stipends is currently \$21,500 per year per student, and budgeting for stipends should be made on this basis for each year of the award. NSF also provides a cost-of-education allowance for tuition, health insurance, and normal fees of \$10,500 per year per student. If this allowance is not fully required, then it may be used to support other IGERT student-related activities. Funds requested for graduate students should be listed in Participant Support Costs: stipends in F.1, travel in F.2, subsistence in F.3, and cost-of-education allowances in F.4. Undergraduate student stipends should be consistent with those of the NSF Research Experiences for Undergraduates program (NSF 01-121), and postdoctoral stipends may be determined by the institution. If applicable, these costs should be listed separately on lines B.4 and B.1, respectively. At most two half-time postdoctoral positions may be supported with IGERT funds. All stipend recipients must be citizens or permanent residents of the U.S. or its possessions.

Purchase of shared research equipment, special-purpose research materials, software and databases may be requested from within the first-year special allocation, and should be listed in Equipment, line D. Personnel and shop costs for developing and constructing special instruments may be requested within the regular yearly budget. Funds for facility renovation or for equipment installation or maintenance are not allowed. Awards will carry an 8% allowance for indirect costs based on the total direct cost, excluding equipment and cost-of-education allowances.

For multi-institution projects, the lead institution shall submit the proposal, with other participating institutions included under subawards. Budgets shall be provided for the overall project as well as individually for the lead institution and for each participating institution that receives a subaward.

Budget Justification (3-page limit): Provide a justification for the funds requested for the overall project in each budget category of Section (F), above. Describe the proposed allocation of funds in the major budget categories with sufficient clarity to show how resources will be utilized in carrying out the planned IGERT project activities. Indicate the total number of graduate students to be supported and the staging and duration of their support on IGERT funds. For shared research equipment, special-purpose materials, software and databases, specify the model, source, and current or expected cost whenever possible, with a brief explanation of the need for each requested item and a description of provisions for maintenance and operating expenses. If additional funds are requested for international activities, indicate the planned allocations over the project duration. Provide details of anticipated resource commitments of other organizations expected to participate in the IGERT project, such as government, industry, non-U.S. institutions, or private foundations. Appropriate letters of commitment from participating organizations should be included in Supplementary Documentation, Section (I).

(G) Current and Pending Support (not required): Current research support should be described in Biographical Sketches and Current Support, Section (E), above.

(H) Facilities, Equipment and Other Resources (1-page limit): Provide a description of available facilities and major instruments that are required for the research. If requested equipment or materials duplicate existing items, explain the need for the additional items.

(I) Supplementary Documentation: Up to eight letters of commitment may be provided as part of the proposal, with up to four additional letters when international activities are proposed. One letter must be from the senior administration of the submitting institution describing the commitment of the institution to achieving the goals of the IGERT project. If internships or other off-site activities are planned, letters from host organizations should document willingness to receive students and the expected role of individual mentors.

B. Cost Sharing Requirements

Cost Sharing: Cost sharing is not required by the IGERT program.

Indirect Cost (F&A) Limitations: Awards will carry an 8% allowance for indirect costs based on the total direct cost, excluding equipment and cost-of-education allowances.

Other Budgetary Limitations: The graduate student stipend allowance is currently \$21,500 per year per student. NSF is seeking to raise graduate stipends to \$25,000, in which case additional project funding will be provided. All graduate and other stipend recipients must be citizens or permanent residents of the U.S. or its possessions.

C. Deadline Dates

All proposals must be submitted via FastLane by 5:00 PM local time on the deadline dates listed at the beginning of this solicitation. Applicants are urged to submit well in advance of the stated deadlines to avoid any possible delays in use of the FastLane system.

D. FastLane Requirements

Proposers are required to prepare and submit all proposals for this Program Solicitation through the FastLane system. Detailed instructions for proposal preparation and submission via FastLane are available at: <http://www.fastlane.nsf.gov/a1/newstan.htm>. For FastLane user support, call 1-800-673-6188 or e-mail fastlane@nsf.gov.

Submission of Electronically Signed Cover Sheets. Only full proposals require submission of the electronically signed cover sheet. The Authorized Organizational Representative (AOR) must electronically sign the proposal Cover Sheet to submit the required proposal certifications (see Chapter II, Section C of the Grant Proposal Guide for a listing of the certifications). The AOR must provide the required certifications within five working days following the electronic submission of the proposal. Further instructions regarding this process are available on the FastLane website at: <http://www.fastlane.nsf.gov>.

VI. PROPOSAL REVIEW INFORMATION

A. Proposal Review Process

All proposals submitted in response to this solicitation will be evaluated by interdisciplinary panels of experts. Panel reviewers will be selected for their relevant expertise in substantive areas of the proposed research and education projects by Program Officers on the IGERT Coordinating Committee charged with oversight of the review process. NSF invites proposers to suggest at the time of submission the names of appropriate or inappropriate reviewers. Care is taken to ensure that reviewers have no conflicts of interest with the proposer. Efforts are made to secure diversity among reviewers and to recruit reviewers from nonacademic organizations and minority-serving institutions.

Proposals will be reviewed using the following two merit review criteria established by the National Science Board. The criteria include considerations that help define them. These considerations are suggestions and not all will apply to any given proposal. Reviewers will be asked to address only those considerations that are relevant to the proposal and for which they are qualified to make judgements.

- **What is the intellectual merit of the proposed activity?**

How important is the proposed activity to advancing knowledge and understanding within its own field or across different fields? How well qualified is the proposer (individual or team) to conduct the project? (If appropriate, the reviewer will comment on the quality of the prior work.) To what extent does the proposed activity suggest and explore creative and original concepts? How well conceived and organized is the proposed activity? Is there sufficient access to resources?

- **What are the broader impacts of the proposed activity?**

How well does the activity advance discovery and understanding while promoting teaching, training, and learning? How well does the proposed activity broaden the participation of underrepresented groups (e.g., gender, ethnicity, disability, geographic, etc.)? To what extent will it enhance the infrastructure for research and education, such as facilities, instrumentation, networks, and partnerships? Will the results be disseminated broadly to enhance scientific and technological understanding? What may be the benefits of the proposed activity to society?

NSF staff will give careful consideration to the following in making funding decisions:

Integration of Research and Education

One of the principal strategies in support of NSF's goals is to foster integration of research and education through the programs, projects, and activities it supports at academic and research institutions. These institutions provide abundant opportunities where individuals may concurrently assume responsibilities as researchers, educators, and students and where all can engage in joint efforts that infuse education with the excitement of discovery and enrich research through the diversity of learning perspectives.

Integrating Diversity into NSF Programs, Projects, and Activities

Broadening opportunities and enabling the participation of all citizens – women and men, underrepresented minorities, and persons with disabilities – is essential to the health and vitality of science and engineering. NSF is committed to this principle of diversity and deems it central to the programs, projects, and activities it considers and supports.

Additional IGERT Review Criteria

In responding to the standard NSF review criteria, reviewers will be asked to place emphasis on the following considerations in furthering IGERT program objectives:

- Importance and coherence of the interdisciplinary theme, including its effectiveness as an intellectual focus for all participating scientists, engineers, and educators;
- Quality of the proposed research efforts, and their appropriateness to the interdisciplinary theme;
- Quality and innovation in the planned graduate education and training mechanisms, and in their integration with the research;
- Effectiveness of career development opportunities and provision for developing professional and personal skills, an international perspective, and instruction in ethics and the responsible conduct of research;
- Effectiveness of the strategy for recruitment, mentoring, and retention of U.S. graduate students, including those from groups underrepresented in science and engineering;
- Effectiveness in contributing to development of a globally-engaged science and engineering workforce;
- Appropriateness of the plans for assessment of project performance;
- Appropriateness of the administrative plan and organizational structure in assuring effective allocation of project resources and participation by project members;
- Appropriateness of the budget; and
- Commitment of the institution to furthering project plans and goals and to creating a supportive environment for integrative research and education.

B. Review Protocol and Associated Customer Service Standard

Review panels will be asked to formulate a recommendation to either support or decline each proposal. The Program Officers on the IGERT Coordinating Committee assigned to manage the review process will consider the advice of the review panels in making their recommendations. The Coordinating Committee will also consider, if applicable, results from prior support, including information derived from on-site evaluation.

For each proposal, a summary rating and accompanying narrative of the panel deliberations (panel summary) will be completed and signed by the panel. An individual rating and accompanying narrative will also be completed and signed by at least three reviewers on the panel assigned to provide a written review of the proposal. In all cases, reviews are treated as confidential documents. Verbatim copies of the individual reviews and panel summary, excluding the names of the reviewers, are provided to the applicant. In addition, the applicant will receive an explanation of the decision to award or decline funding.

NSF will inform preproposal applicants within four months after the submission deadline whether they are being invited to submit to the full proposal competition. This notification will allow invited applicants at least three months time to prepare full proposals. Applicants submitting full proposals will receive notice of the outcome of the competition within six months following the full proposal submission deadline.

After programmatic approval has been obtained, the proposals recommended for funding will be forwarded to the Division of Grants and Agreements for review of business, financial, and policy implications and the processing and issuance of a grant or other agreement. Applicants are cautioned that only a Grants and Agreements Officer may make commitments, obligations or awards on behalf of NSF or authorize the expenditure of funds. No commitment on the part of NSF should be inferred from technical or budgetary discussions with a NSF Program Officer. Principal Investigators or organizations that make financial or personnel commitments in the absence of a grant or cooperative agreement signed by the NSF Grants and Agreements Officer do so at their own risk.

VII. AWARD ADMINISTRATION INFORMATION

A. Notification of the Award

Notification of the award is made to the submitting organization by a Grants Officer in the Division of Grants and Agreements. Organizations whose proposals are declined will be advised as promptly as possible by the cognizant NSF Program Division administering the program. Verbatim copies of reviews, not including the identity of the reviewer, will be provided automatically to the Principal Investigator.

B. Award Conditions

An NSF award consists of: (1) the award letter, which includes any special provisions applicable to the award and any numbered amendments thereto; (2) the budget, which indicates the amounts, by categories of expense, on which NSF has based its support (or otherwise communicates any specific approvals or disapprovals of proposed expenditures); (3) the proposal referenced in the award letter; (4) the applicable award conditions, such as Grant General Conditions (NSF-GC-1)* or Federal Demonstration Partnership (FDP) Terms and Conditions;* and (5) any announcement or other NSF issuance that may be incorporated by reference in the award letter. Cooperative agreement awards also are administered in accordance with NSF Cooperative Agreement Terms and Conditions (CA-1). Electronic mail notification is the preferred way to transmit NSF awards to organizations that have electronic mail capabilities and have requested such notification from the Division of Grants and Agreements.

*These documents may be accessed electronically on NSF's Web site at http://www.nsf.gov/home/grants/grants_gac.htm. Paper copies may be obtained from the NSF Publications Clearinghouse, telephone (301) 947-2722 or by e-mail from pubs@nsf.gov.

More comprehensive information on NSF Award Conditions is contained in the NSF Grant Policy Manual (GPM) Chapter II, available electronically on the NSF Web site at <http://www.nsf.gov/cgi-bin/getpub?gpm>. The GPM is also for sale through the Superintendent of Documents, Government Printing Office (GPO), Washington, DC 20402. The telephone number at GPO for subscription information is (202) 512-1800. The GPM may be ordered through the GPO Web site at <http://www.gpo.gov>.

C. Reporting Requirements

For all multi-year grants (including both standard and continuing grants), the PI must submit an annual project report to the cognizant program officer at least 90 days before the end of the current budget period.

Awarded IGERT projects will submit their annual project reports through a special IGERT Web-based reporting system that standardizes the evaluation across all sites. Any proposed carrying forward of funds should be justified in the annual report. An on-site evaluation will be conducted by an external team of experts in the third year of implementation of the grant.

Within 90 days after the expiration of an award, the PI also is required to submit a final project report. Approximately 30 days before expiration, NSF will send a notice to remind the PI of the requirement to file the final project report. Failure to provide final technical reports delays NSF review and processing of pending proposals for that PI. PIs should examine the formats of the required reports in advance to assure availability of required data.

NSF has implemented an electronic project reporting system, available through FastLane. This system permits electronic submission and updating of project reports, including information on project participants (individual and organizational), activities and findings, publications, and other specific products and contributions. PIs will not be required to re-enter information previously provided, either with a proposal or in earlier updates using the electronic system.

VIII. CONTACTS FOR ADDITIONAL INFORMATION

General information regarding the IGERT program can be obtained from the NSF Web site at <http://www.nsf.gov/igert>. Specific inquiries should be directed to one of the following members of the IGERT Coordinating Committee:

Lawrence Goldberg (Chair), ECS/ENG, (703) 292-8339, lgoldber@nsf.gov

Wyn Jennings (Co-Chair), DGE/EHR, (703) 292-5307, pjennin@nsf.gov

Gerry Berkowitz, MCB/BIO, gberkowi@nsf.gov

Judith Skog, DBI/BIO, jskog@nsf.gov

Rita Rodriguez, EIA/CISE, rrodrigu@nsf.gov

Emir Macari, HRD/EHR, emacari@nsf.gov

Kenneth Whang, REC/EHR, kwhang@nsf.gov

Geoffrey Prentice, CTS/ENG, gprentic@nsf.gov

Bruce Hamilton, BES/ENG, bhamilto@nsf.gov

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K. L. Murty, DMR/MPS, kmurty@nsf.gov

Roger Lewis, DMS/MPS, rlewis@nsf.gov

Laura Razzolini, SES/SBE, lrazzoli@nsf.gov

Mark Weiss, BCS/SBE, mweiss@nsf.gov

Jane Dionne, OPP, jdionne@nsf.gov

Cassandra Dudka, INT, cdudka@nsf.gov

Questions related to the use of FastLane should be directed to FastLane User Support, at 1-800-673-6188, or fastlane@nsf.gov.

IX. OTHER PROGRAMS OF INTEREST

The NSF Guide to Programs is a compilation of funding for research and education in science, mathematics, and engineering. The NSF Guide to Programs is available electronically at <http://www.nsf.gov/cgi-bin/getpub?gp>. General descriptions of NSF programs, research areas, and eligibility information for proposal submission are provided in each chapter.

Many NSF programs offer announcements or solicitations concerning specific proposal requirements. To obtain additional information about these requirements, contact the appropriate NSF program offices. Any changes in NSF's fiscal year programs occurring after press time for the Guide to Programs will be announced in the NSF E-Bulletin, which is updated daily on the NSF web site at <http://www.nsf.gov/home/ebulletin>, and in individual program announcements/solicitations. Subscribers can also sign up for NSF's Custom News Service (<http://www.nsf.gov/home/cns/start.htm>) to be notified of new funding opportunities that become available.

ABOUT THE NATIONAL SCIENCE FOUNDATION

The National Science Foundation (NSF) funds research and education in most fields of science and engineering. Awardees are wholly responsible for conducting their project activities and preparing the results for publication. Thus, the Foundation does not assume responsibility for such findings or their interpretation.

NSF welcomes proposals from all qualified scientists, engineers and educators. The Foundation strongly encourages women, minorities and persons with disabilities to compete fully in its programs. In accordance with Federal statutes, regulations and NSF policies, no person on grounds of race, color, age, sex, national origin or disability shall be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving financial assistance from NSF (unless otherwise specified in the eligibility requirements for a particular program).

Facilitation Awards for Scientists and Engineers with Disabilities (FASSED) provide funding for special assistance or equipment to enable persons with disabilities (investigators and other staff, including student research assistants) to work on NSF-supported projects. See the program announcement/solicitation for further information.

The National Science Foundation has Telephonic Device for the Deaf (TDD) and Federal Information Relay Service (FIRS) capabilities that enable individuals with hearing impairments to communicate with the Foundation about NSF programs, employment or general information. TDD may be accessed at (703) 292-5090, FIRS at 1-800-877-8339.

The National Science Foundation is committed to making all of the information we publish easy to understand. If you have a suggestion about how to improve the clarity of this document or other NSF-published materials, please contact us at plainlanguage@nsf.gov.

PRIVACY ACT AND PUBLIC BURDEN STATEMENTS

The information requested on proposal forms and project reports is solicited under the authority of the National Science Foundation Act of 1950, as amended. The information on proposal forms will be used in connection with the selection of qualified proposals; project reports submitted by awardees will be used for program evaluation and reporting within the Executive Branch and to Congress. The information requested may be disclosed to qualified reviewers and staff assistants as part of the proposal review process; to applicant institutions/grantees to provide or obtain data regarding the proposal review process, award decisions, or the administration of awards; to government contractors, experts, volunteers and researchers and educators as necessary to complete assigned work; to other government agencies needing information as part of the review process or in order to coordinate programs; and to another Federal agency, court or party in a court or Federal administrative proceeding if the government is a party. Information about Principal Investigators may be added to the Reviewer file and used to select potential candidates to serve as peer reviewers or advisory committee members. See Systems of Records, NSF-50, "Principal Investigator/Proposal File and Associated Records," 63 Federal Register 267 (January 5, 1998), and NSF-51, "Reviewer/Proposal File and Associated Records," 63 Federal Register 268 (January 5, 1998). Submission of the information is voluntary. Failure to provide full and complete information, however, may reduce the possibility of receiving an award.

Pursuant to 5 CFR 1320.5(b), an agency may not conduct or sponsor, and a person is not required to respond to an information collection unless it displays a valid OMB control number. The OMB control number for this collection is 3145-0058. Public reporting burden for this collection of information is estimated to average 120 hours per response, including the time for reviewing instructions. Send comments regarding this burden estimate and any other aspect of this collection of information, including suggestions for reducing this burden, to: Suzanne Plimpton, Reports Clearance Officer, Division of Administrative Services, National Science Foundation, Arlington, VA 22230, or to Office of Information and Regulatory Affairs of OMB, Attention: Desk Officer for National Science Foundation (3145-0058), 725 17th Street, N.W. Room 10235, Washington, D.C. 20503.

OMB control number: 3145-0058