Request for Proposals: Summer Biotechnology Workshops for Educators

Purpose
The North Carolina Biotechnology Center, by way of this announcement, solicits contract proposals from faculty at post-secondary educational institutions to host and conduct professional development workshops in biotechnology for educators. These workshops, normally held in the summer, are primarily intended to enable middle and high school teachers to:
• Learn about the tools, foundational science, and applications of biotechnology;
• Encourage student interest in relevant science, technology, and careers;
• Support the new North Carolina Essential Standards for Biology, outlined by the NC Department of Public Instruction and to be implemented during the 2012-2013 school year.

Submitting Proposals
Proposals must be submitted electronically as described herein. Proposals sent by other means will not be accepted.

Go to www.ncbiotech.org/SummerWorkshopRFP to begin the application process. Be sure to carefully read the Electronic Application Instructions as well as this RFP before beginning your proposal.

All proposals must be received at the Biotechnology Center no later than 12:00 noon on January 25, 2012.

Workshop Types and General Features
We solicit contract proposals for two different types of workshops:
• Introductory Biotechnology Workshops for High School Teachers: These workshops are principally targeted to high school science teachers, and the content is prescribed as detailed below.
• Special Topic/Special Audience Workshops: These workshops may focus on particular aspects of biotechnology science and applications; and if appropriate may require completion of an Introductory Biotechnology Workshop as a prerequisite for attendance. Alternatively, these workshops may target the needs of specific groups of educators: for example, middle school teachers or Career Technical Education teachers. In any case, content is proposed by the applicant and may be refined in consultation with the Center.

Workshop Requirements
• All workshops must be open to educators from across North Carolina; those applicants who teach out-of-state are usually not accepted.
• Workshops should serve a minimum of eight and a maximum of 20 participants.
• Workshops must be offered between June 18 and August 3, 2012.

Workshop Participant Benefits
All participants at Introductory Biotechnology Workshops and Special Topic/Special Audience Workshops intended for K-12 teachers receive the following benefits:
• $50 per diem
• CEUs
• Textbook as relevant (*Molecular Biology and Biotechnology*, see below)
• Center literature and media materials as relevant
• Access to the Center’s programs providing free lab supplies and lab equipment on loan

Your proposed contract budget will need to cover some of these benefits as noted in the Budget section below.

**Workshop Objectives**

Workshop participants should learn:

• The fundamental scientific concepts underlying biotechnology and relevant laboratory techniques
• Effective methods for teaching these scientific concepts and laboratory techniques in the classroom
• Methods for integrating biotechnology into the new North Carolina Essential Standards for Biology ([www.dpi.state.nc.us/docs/acre/standards/new-standards/science/biology.pdf](http://www.dpi.state.nc.us/docs/acre/standards/new-standards/science/biology.pdf)) or other course curricula, as applicable

**Note:** The North Carolina Biotechnology Center believes that the success of any workshop is ultimately measured by the level of incorporation of workshop material into participants’ courses once the workshop is over.

**Workshop Instructional Teams**

Workshops must be taught by a team of at least one college faculty member, who serves as lead instructor; and at least one, usually two, master teachers—generally high school science teachers with extensive experience implementing biotechnology content in the classroom. If you are not acquainted with such a teacher, contact Bill Schy at the Center for a list of master teachers who have appropriate credentials. Typically the college professor lectures, leads discussions, and teaches wet labs. The master teachers assist with wet labs, demonstrate other activities, and provide instruction on pedagogy and practical information on how to implement biotechnology in the classroom.

---

**Introductory Biotechnology Workshops**

The primary audience for Introductory Workshops is high school science teachers, typically those teaching standard or advanced biology and chemistry courses. College faculty, especially those with freshman biology teaching responsibilities, are also invited. These workshops must be five days in duration.

**Workshop Content**

Introductory Biotechnology workshops should be based primarily on the text, *Molecular Biology and Biotechnology: A Guide for Teachers, 3rd Edition* (Kreuzer and Massey, 2008) and should blend lecture/discussions with hands-on activities (wet and dry labs and pedagogically useful web sites).

The following topics must be covered in lectures and discussion. Instructors may add additional lecture topics at their discretion, if time permits.

• DNA structure and function
• Introduction to gene expression and gene regulation, and their relationship to cell differentiation/specialization
• Protein structure and function and their relationship to specific phenotypes/traits
• Restriction enzymes, their role in recombinant DNA technology, and restriction analysis of DNA
• How bacteria acquire antibiotic resistance
• *Transformation of E. coli*
• Molecular biology of gene cloning
• Difference between gene cloning and organismal cloning by somatic cell nuclear transfer
• The polymerase chain reaction in theory and practice
• Current commercial applications of biotechnology
• Societal issues related to applications of biotechnology, including one or more of the following: genetically engineered plants, stem cell research and ramifications of the Human Genome Project
• Biotechnology careers and their education requirements.
The following practical topics must be discussed or demonstrated in laboratory or pre-lab sessions:

• Safely growing, storing and disposing of \textit{E. coli} in the lab; proper handling of cultures and disinfection of materials and work areas
• Making and sterilizing solutions and media needed for classroom experiments
• Sterile technique
• Preparing, handling, and staining agarose gels
• Classroom preparation for wet labs
• Using a thermal cycler (this should include demonstration or participant use of a thermal cycler available through Center’s Equipment Loan program)

The following activities, most from \textit{Molecular Biology and Biotechnology}, must be performed:

• From Genes to Proteins
• Transformation of \textit{Escherichia coli}
• DNA amplification by PCR
• Paper PCR activity
• Sizes of the \textit{Escherichia coli} and Human Genomes
• DNA Scissors: Introduction to Restriction Enzymes
• DNA Goes to the Races
• Recombinant Paper Plasmids
• Restriction Analysis of Lambda DNA
• Restriction Analysis Challenge Worksheets

A copy of \textit{Molecular Biology and Biotechnology} may be obtained by contacting Amy Black, Education and Training Program Specialist at the Biotechnology Center at amy_black@ncbiotech.org or ASM Press (1-800-546-2416 or online at www.asmpress.org).

**Workshop Objectives**

The choice of workshop topic and audience is up to the Project Director. We strongly recommend that you send a one- to three-page description of the workshop to Bill Schy, (bill_schy@ncbiotech.org) for a preliminary review before preparing your proposal. Please include a description of the intended audience, the general scope of the workshop, some specific learning objectives, and a draft agenda, including examples of lecture topics and hands-on activities to be featured.

Workshop participants should learn:

• The fundamental scientific concepts underlying the chosen topic
• Hands-on laboratory activities that illustrate these scientific concepts (if applicable)
• Applications of the techniques and technologies related to the chosen topic (if appropriate)
• Societal issues raised by the technologies (if applicable)
• Effective strategies for incorporating workshop material into the classroom

**Workshop Focus**

Possible areas of focus for workshops may include, but are not limited to, the following:

**Special Audiences**

• Middle school teachers: Integrating biotechnology as appropriate to relevant topics covered in grades 6, 7, or 8.
• Career Technical Education teachers: Teaching biotechnology content relevant to: (1) the Exploring Biotechnology curriculum in middle school, or (2) high school curricula in agriculture, food science, health occupations, or technology.

Note: If you would like to present a middle school workshop, please contact Bill Schy (bill_schy@ncbiotech.org) before beginning your proposal.
Special Topics
Topics of particular interest to us include, but are not limited to, the following:

- Genetic manipulation, selection, and propagation of plants using tissue culture in the classroom
- Stem cells: their therapeutic promise and issues affecting their use
- Gene expression and cellular differentiation
- Molecular biology of gene cloning
- The molecular biology of antibiotic resistance, and its impact on infectious disease and public health
- Environmental applications of biotechnology
- Nanobiotechnology
- Development of Vaccines: new technologies to boost preparedness for any future pandemics
- Bioinformatics: using genomic information and algorithms to discover genes, their functions, and evolutionary relationships
- Biotech-enhanced crops: examination of global productivity, food safety, and environmental cost/benefits from a scientific perspective
- Using simple bioreactors to teach cellular metabolism and energy conversion; as well as to model industrial bioprocessing
- Biotechnology Basics Workshop: an abbreviated 3-day workshop covering the most essential concepts of an Introductory Workshop (contact Bill Schy for more details)

Required Workshop Elements
Instructors must blend lectures and discussions with relevant hands-on activities teachers can use in the classroom. Approaches that use inquiry-based or problem-based learning methods are particularly welcome.

For K-12 teachers, you must provide at least two lesson plans at the workshop. The lesson plans should include:

- An introduction to the activity
- Identification of relevant topics in new North Carolina Essential Standards for Biology (if applicable)
- Learning objectives of activity
- Class time required
- Materials needed and suppliers, including catalog numbers
- Other resource materials or references
- A clear step-by-step description of the activity for teachers and students
- Preparation notes for teachers
- Questions for the students
- Answers to student questions

Examples of lesson plans appropriate for high school teachers can be found in Molecular Biology and Biotechnology: A Guide for Teachers (see Introductory Biotechnology Workshop section above for additional information on this text). Please note: for purposes of your proposal, you need only provide an outline of each lesson plan.

Other Contractual Requirements: All Workshops

The Project Director will:

1. Identify members of the workshop instructor team.
2. Identify the workshop site. The site must be sufficiently equipped to cover any laboratory techniques included in the workshop.
3. Select the workshop dates.
4. For K-12 workshops, publicize the workshop to prospective attendees in your region, and direct interested teachers to apply on the North Carolina Biotechnology Center’s website promptly when registration opens.
5. Arrange for room and board and parking for workshop participants, and if needed, the workshop instructors. Room and board is to include housing and two meals per day, and morning and afternoon break refreshments for the duration of the workshop.
6. Ensure that at least one planning meeting for all workshop instructors takes place at least four weeks prior to the start of the workshop.
7. Mail workshop preparation packages to participants at least two weeks before the first day of the workshop. The prep packages will include a cover letter from your institution that specifies the workshop dates and times, agenda, driving directions, campus map, parking arrangements (and passes if appropriate), housing arrangements, specific meals provided, and credit awarded upon
workshop completion, if any. The Project Director will also provide sufficient information in the package and necessary signage on site to ensure that participants can easily find the workshop site on the first day.

8. Special Topic/Special Audience workshops: Provide any course materials required (if applicable).

9. Have participants formally evaluate the workshop (evaluation forms will be provided by the Center).

10. Provide participants and the Center representative visiting the workshop with a CD or flash drive loaded with materials provided to participants during the workshop.

11. Send the North Carolina Biotechnology Center a final report.

The North Carolina Biotechnology Center will:

1. Publicize workshop sites and dates statewide, online and by mail.

2. Arrange for certificate renewal credit for workshop participants.

3. Send copies of Molecular Biology and Biotechnology: A Guide for Teachers, 3rd Edition and other educational materials to the Project Director at least four weeks before the first day of the workshop.

4. Send a representative to visit the workshop who will bring additional educational materials and make a presentation about Biotechnology Center programs, the biotechnology industry in North Carolina, and biotechnology careers. The Biotechnology Center representative may also be available to give other lecture(s) at the request of the instructors.

5. Arrange for use, or demonstration, of the Biotechnology Center’s reservable equipment kits in the workshop. Items available include:
   • electrophoresis boxes with casting trays and combs
   • electrophoresis power supplies
   • micropipets: small volume (1 – 20 µl) and large volume (100 – 1000 µl)
   • microcentrifuges
   • thermal cyclers

Proposal Content

Remember that the only acceptable form of proposal submission is online. Your proposal must contain:

- A title page that includes the following information: Title of Proposal, Project Director, Institution, Project Director's institutional address, phone number and e-mail address (use the cover page template provided at www.ncbiotech.org/SummerWorkshopRFP, under "Links.")
- Names and addresses of the college faculty member and high school teachers who will serve as the workshop instructors, letters confirming their commitment to teach the workshop, and their curriculum vitae
- Description of workshop site, including a list of equipment available, and the number of participants that can be accommodated
- Letter from a department head or other appropriate official at your institution providing permission to use the laboratory and classroom space
- Workshop dates (you may provide more than one possible date for your workshop)
- Detailed day-by-day workshop schedule, including planned lecture topics and lab activities
- Detailed budget – a link to a budget form is provided for your convenience on our website (see Budget section below)

For Special Topics/Special Audiences Workshops, also:

- Describe in greater detail the proposed lab activities, the scientific concepts illustrated by each, and how these activities support the workshop’s learning objectives
- Include an outline of the lesson plans for K-12 audiences (minimum two) that will be provided

Budget

The following are allowable categories for expenditures:

- Personnel. Salary for all teaching and support staff. Contact Bill Schy at the Biotechnology Center (919-541-9366) or at bill_schy@ncbiotech.org if you have questions about salary.
• **Participant support.** Participant stipends, room and board. This includes a standard $50 *per diem* stipend, housing, two meals (typically breakfast and lunch), and morning and afternoon break refreshments for the week. Please estimate costs based on the maximum number of participants your institution can accommodate or 20, whichever is less. When estimating lodging costs, keep in mind that for any location, approximately half of the participants will be commuters and not require housing. Include teaching staff in your housing and meal estimates as necessary.

• **Supplies.** This category includes biologics, reagents, disposables, instructional materials, and copying or other expenses. Please provide a cost breakdown under each sub-category.

You also may have the option to host a follow-up session on a Saturday during October or November following the workshop to support classroom implementation. Each participant at the follow-up session would receive CEUs, lunch, and a $50 stipend for attending the entire session. If you wish to include a follow-up session, be sure to obtain your institution’s permission to use its facilities on that date, and include a reference to the “follow-up session” in the institutional support letter.

Applicants will be charged a non-refundable standard $75 registration fee, payable to the North Carolina Biotechnology Center as part of the application process.

**Evaluation Criteria**

The North Carolina Biotechnology Center’s Education and Training Program staff will evaluate each proposal using the following criteria:

• Qualifications and experience of project personnel
• Feasibility of workshop schedule
• Specific workshop content and lesson plan outlines (if applicable)
• Adequacy of the laboratory facility where the workshop will be held
• Total cost of the workshop and appropriateness of the budget
• Workshop site (geographic distribution of workshops across the state is an important consideration)

• Relevance to the new North Carolina Essential Standards for Biology (where appropriate)
• Previous workshop evaluations and project reports on file at the Biotechnology Center
• Likelihood of classroom implementation of workshop material by target audience

**For Special Topics/Special Audiences Workshops**

• Relevance to biotechnology
• Appropriateness of topic and its treatment for the target audience and ease of incorporation into their courses