



Activities and Conversations about Synthetic Biology

Kit Application Overview

www.buildingwithbiology.org

PROJECT PURPOSE

The purpose of the Building with Biology project is to create conversations in museums among scientists and public audiences about the emerging field of synthetic biology and its societal implications.

Synthetic biology uses new techniques combining biology and engineering to make new or modified living things and materials. The field is exploring where biology-based products might provide solutions to a wide diversity of problems in health, energy, and the environment.

BUILDING WITH BIOLOGY KIT

Two-hundred (200) free physical kits will be awarded to successful applicants to be used in Summer 2016 Building with Biology events and conversations nationwide. Kits will include:

- Hands-on activities and programs to stimulate conversations among scientists and public
- Professional development and collaboration materials

Please note that in addition to the physical kits, educational materials will also be available online for free download. Digital kits will be available for download in June 2016.

TIMELINE

- **Mid-November, 2015:** Application opens online to apply for a free Building with Biology kit
- **February 1, 2016:** Deadline to submit application
- **March 1, 2016:** Notification of award decisions
- **June 2016:** Kits delivered to successful applicants
- **Mid-June – September, 2016:** Host a Building with Biology event
- **Three weeks after hosting event:** Reports due online

REQUIREMENTS

Organizations receiving kits are required to:

- **Host an Event:** Host at least one Building with Biology event that involves conversations between scientists or science students and public audiences between June - September 2016.
- **Museum-Scientist Collaborations:** Museums holding events must collaborate with local scientists, science students, or members of the synthetic biology or related fields. Scientists receiving kits must collaborate with a local informal science organization. (Museum hosts please see information provided on page 5-7 for advice on finding volunteer scientists; regional hub leaders will also assist event hosts to find local collaborators.)
- **Orientation / Training:** Event hosts must hold an orientation or provide training for their scientist and informal science education event volunteers. Kits will include training and orientation materials to help prepare your event volunteers and staff for conversations with the public about synthetic biology.
- **Report:** Submit an online report within three weeks following your event that includes email addresses from event volunteers 18 years and older who are willing to participate in a post-event volunteer survey.

Optional opportunities (not required):

- **Forums:** We encourage event hosts to host one or more of the discussion forums that will be provided in the kit. Forums are one- to two-hour long facilitated discussions for adults and older teenagers that promote exploration of a topic and foster dialogue and deliberation; forums are typically organized as a special event program for adult audiences requiring advance registration.
- **Online training in public engagement for scientists:** Online training opportunities will be provided for scientists focusing on public engagement and science communication skills.
- **Online training for event hosts:** Online training opportunities will be provided for event hosts.

ELIGIBILITY

The physical kit is designed for informal science educational public events and outreach. To be eligible to receive a physical kit, organizations must be:

- Located in the United States
- An organization that does public informal science outreach and education including:
 - 1) Informal science education organizations including science museums, science centers, and children's museums
 - 2) College or university education outreach programs this may include individual scientists and iGEM team outreach efforts
 - 3) DIY bio centers

*Please note that Institutions located outside the United States and K-12 schools are **not** eligible to receive physical kits. Consider downloading a digital kit if your organization does not meet eligibility criteria. Digital kits will be available for download in June 2016.*

APPLICATION PROCESS

Applications must be submitted online using SurveyGizmo by February 1, 2016.

<http://www.surveygizmo.com/s3/2342311/Building-with-Biology-Kit-Application>

Please note that it is NOT possible to save your work in the SurveyGizmo online form and return for additional edits. Reports left idle for too long will go blank when you progress to the next screen. Please plan to complete the online report in one session. You may want to write your responses in a Word doc, save, and then cut and paste that information into this report. You may download the application in PDF format and Word Document formats here:

<http://www.buildingwithbiology.org/get-involved>

SELECTION PROCESS

The project team will review the kit applications and award kits only to organizations that meet the eligibility criteria. A total of 200 kits will be awarded through a competitive award process. Proposals will undergo a peer review process by project representatives. We will be looking to select applications that demonstrate strong alignment with the project purpose, that comply with the project terms, and that represent geographic diversity. If multiple applications are received from the same geographic location, applicants will likely be asked to collaborate on an event and to share a kit. Applicants will be informed of award status in March 2016.

REPORTING REQUIREMENTS

Physical kit recipients are required to complete a short online report describing their experiences with the kit. Successful applicants will be provided with a link to the final report. Required reports should be submitted online within three weeks of holding your event.

EVALUATION

Evaluation is also a part of this project in a variety of ways in order to capture the impacts of the project activities on volunteers as well as members of the public. Project evaluators will be collecting three kinds of data:

1) Evaluation surveys for event hosts: All event hosts will be invited to participate in the summative evaluation through pre-event and post-event surveys. We highly encourage event hosts to respond to these surveys to help us learn from your experiences.

2) Evaluation surveys for event volunteers: We encourage event hosts to collect email addresses from event volunteers 18 years and older so that volunteers may participate in a post-event volunteer survey. (Event hosts should submit volunteer email address via the required online report within three weeks of hosting the Building with Biology event.)

3) Public data collection: A sub-set of event hosts may opt to participate in evaluation about their public audiences. Event hosts will be given the chance to apply to participate in this evaluation after decisions are made about kit distribution. Participation will involve attending special online evaluation training, support from a member of the project evaluation team as needed, and collecting data from the public at their events using a passport activity and survey instruments provided by the project evaluators. In return for participating in public data collection, evaluators will send you a summary report of your data. Event hosts opting to participate in the collection of data from the public would be required to:

- a) Provide us with documentation that the person who will be collecting data from the public has completed human subjects training from NIH or CITI. Documentation can be an existing completion certificate or the data collector can complete a 2-hour of Human Subjects online training course prior to the event (the online training from NIH is free to complete),
- b) Have the person who will be collecting data from the public at the event attend a 1-hour online evaluation training specific to the project prior to the event, (evaluators will also be available to provide additional support as needed), and
- c) This same person who has attended the evaluation training would collect data from the public during the event.

MORE INFORMATION

For project questions and inquiries, please send an email to buildingwithbiology@mos.org

HOW TO FIND A SCIENTIST IN YOUR AREA

The project requires informal science education organizations (museums) to collaborate with scientists. Scientists may include professors and research staff from universities, iGEM team members, undergraduate and graduate students, and representatives from DIY Bio centers and industry.

Who you choose collaborate with is a **local** decision; but receipt of a physical kit does require collaboration between informal science education organizations (museums) and scientists. Building with Biology regional hub leaders will assist you in finding local collaborators in your geographic area. Kits will include training and orientation materials to help prepare your event volunteers and staff for conversations with the public about synthetic biology.

Here are a few suggestions for finding a scientist in your area:

- **Local colleges:** Many colleges and universities have synthetic biology scientists on staff. Some colleges have synthetic biology programs but you may often find people in this field located in a variety of departments including genetics, microbiology, molecular biology, biological engineering, and chemical engineering; once you connect with a faculty or staff member they can also suggest undergraduate and graduate students who could volunteer at your event
- **Professional societies with local chapters:** Below are a few examples:
 - The **American Society for Biochemistry and Molecular Biology (ASBMB)** purpose is to advance the science of biochemistry and molecular biology; ASBMB has thousands of members in the United States; a list of student chapters is available here: <http://www.asbmb.org/education/studentchapters/regions/>
You can add your event here: <http://www.asbmb.org/Outreach/Map/>
 - **Society for Biological Engineers** have several student chapters in the United State; a list of student chapters is available here: <http://www.aiche.org/sbe/community/students/chapters>
 - **American Chemical Society (ACS)** has 185 local sections in the United States: <http://webapps.acs.org/llookup/>
<http://www.acs.org/content/acs/en/membership-and-networks/l/websites.html>
- **iGEM Teams:** The iGEM Foundation is dedicated to education and competition, advancement of synthetic biology, and the development of open community and collaboration. The iGEM Competition designed for college students studying synthetic biology; there are over 70 active iGEM teams located in the United States as well as many iGEM alumni: http://igem.org/Team_List.cgi?year=2015
- **DIYBio spaces:** DIYBio spaces are a network of local community labs that provide opportunities and training for citizen scientists, do-it-yourself biologists and engineers, makers, and biohackers: <http://diybio.org/local/>

HOW TO FIND A SCIENTIST IN YOUR AREA *continued*

- **Industry representatives:**

- The Wilson Center has created an interactive map showing both public and private synthetic biology labs: <http://www.synbioproject.org/sbmap/>
- Synberc is a multi-university research center established in 2006 with a grant from the National Science Foundation (NSF) to help lay the foundation for synthetic biology. Synberc's member companies come from all sectors of the biotechnology industry and range from startup to large multinational in size: <http://www.synberc.org/industry/members>

REGIONAL HUB LEADERS

Building with Biology regional hub leaders will be able to help connect you with a scientist in your area; please contact the hub leader in your region and they can help connect you with someone in your area:

- Mid-Atlantic: PA, NJ, MD, DC, DE, OH, and WV
Jayatri Das, jdas@fi.edu, Franklin Institute, Philadelphia, PA, 215-448-1193
- Northeast: NY, VT, NH, ME, RI, CT, and MA
Ali Jackson, ajackson@sciencenter.org, Sciencenter, Ithaca, NY, 607-272-0600
- Southeast: VA, NC, SC, KY, TN, LA, MS, AL, GA, FL, and Puerto Rico
Brad Herring, bradh@ncmls.org, Museum of Life and Science, Durham, NC, 919-220-5429x360
- West: AK, WA, OR, ID, MT, WY, CO, UT, and NM
Tim Hecox, THEcox@omsi.edu, Oregon Museum of Science and Industry, Portland, OR 503-797-4637
- Midwest: ND, SD, NE, KS, MN, IA, MO, WI, IL, MI, and IN
Christina Akers, cakers@smm.org, Science Museum of Minnesota, St. Paul, MN, 651-221-9434
- South: TX, AR, and OK
Kevin Velasquez, kvelasquez@cmhouston.org, Children's Museum of Houston, 713-535-7239
- Southwest: CA, NV, AZ, and HI.
Frank Kusiak, frank_kusiak@berkeley.edu, Lawrence Hall of Science, Berkeley, CA, 510-642-3224

HOW TO FIND ADDITIONAL VOLUNTEERS

In addition to finding a synthetic biologist, you will also probably need to recruit other volunteers to help with your event. Potential sources of volunteers may include

- College students, classes, or clubs with community service requirements
- High school science clubs, or students suggested by local high school science teachers
- Local chapters of professional science and engineering groups that are often associated with local colleges, such as:
 - American Indian Science and Engineering Society: www.aises.org
 - American Chemical Society (ACS): www.acs.org
 - Materials Research Society (MRS): www.mrs.org
 - National Action Council for Minorities in Engineering: www.nacme.org
 - National Society of Black Engineers (NSBE): www.nsbe.org
 - National Organization of Gay and Lesbian Scientists and Technical Professionals: www.noglstp.org
 - Society for Advancement of Chicanos and Native Americans in Science (SACNAS): www.sacnas.org
 - Society of Asian Scientists and Engineers: www.saseconnect.org
 - The Society of Mexican American Engineers and Scientists: www.maes-natl.org
 - Society of Hispanic Professional Engineers: www.shpe.org
 - Society of Women Engineers (SWE): www.swe.org
- Drama and theater students
- Local industry staff and retirees