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**Scientists Teaching Science Online Course 2017**

**Description**

The online course “*Scientists Teaching Science*” teaches about active learning, creating course objectives and test items, and improving your teaching, assessment, and communication techniques for students of all ages. It involves learning the latest research-based techniques used by model instructors around the world. It is appropriate for graduate students, post-doctoral researchers, current faculty members in the sciences, medical practitioners, engineers, and mathematicians who are interested in improving their teaching, training, mentoring, and/or communication skills.

*Come practice with your peers under the instruction of a national award-winning science educator and author.*

The asynchronous course is available 24/7 on any web-enabled device. Unlike other online courses, **one-on-one engagement, personal review of written assignments, and personalized advice on teaching and communicating is guaranteed!** There are also scheduled discussions where you can meet with the instructor in a webinar.

The time needed to complete all readings and activities is estimated to be about 3 hours a week. All participants who complete the course requirements will be eligible for a personal letter of recommendation from the instructor about teaching preparation for future employment. Participants who complete the course requirements will also receive a certificate of completion from the hosting institution.

**Course Objectives:**

1. Identify at least three active learning strategies.
2. Know the four major learning styles and three types of learning environments.
3. Evaluate personal biases and cultural differences and how these affect student outcomes.
4. Interpret interpersonal relationships in light of cultural and gender differences.
5. Compare inquiry-based activities to directed instructional activities.
6. Create course objectives based on Bloom’s Taxonomy.
7. Assess the level of Bloom’s Taxonomy of course objectives.
8. Develop valid multiple choice and essay questions based on objectives.
9. Recognize several steps in effective curriculum design.
10. Compose a Teaching Philosophy Statement.
11. Recommend one or more ways to notify potential students about consequences of cheating or plagiarism.
12. Construct a detailed course syllabus.
13. Evaluate the advantages and disadvantages of teaching and learning in an online environment.
14. Improve your communication skills.

**Certificate of Completion and Reference Letter Requirements:**

Each *Scientists Teaching Science* assignment builds from the previous one, culminating in two documents you can use as templates for job applications and in teaching. Participants must satisfactorily complete six written assignments and all the required elements of nine lessons in order to be eligible for a certificate of completion and a personalized letter of recommendation from the instructor.

**Course Agenda**

*Week One:* **Active Learning and Expert Learners:** discussion of learning styles; assigned readings on current research findings about teaching and active learning. *Assignments:* personal essay on teaching experience; discussion board posts.

*Week Two:* **Learning Environments and Assessments:** discussion on rigor and improving academic outcomes in higher education; assigned readings on improving student outcomes. *Assignments:* first draft of Teaching Philosophy Statement; discussion board posts.

*Week Three:* **Cultural Awareness and Diversity:** discrimination and bias in teaching; assigned readings about experiencing bias in science careers; inclusive classrooms; communicating in a diverse society; discussion about experiencing and handling bias/discrimination. *Assignment:* discussion board posts.

*Week Four:* **Inquiry-Based Science Education:** differences between traditional laboratory activities and inquiry-based investigations; assigned readings on inquiry-based teaching in a college biology class. *Assignments:* NONE.

*Week Five:* **Writing Course Objectives:** Bloom’s Taxonomy and student learning objectives; assigned readings about writing learning objectives. *Assignments:* discussion board posts; 10 learning objectives for a proposed class.

*Week Six:* **Creating Valid Assessments & Alternative Assessments:** using rubrics and test blueprints; effective multiple choice and essay questions; designing and evaluating students without using tests for small and large classes; assigned readings on how to write valid assessment items. *Assignment:*  5 sample test questions based on previous objectives.

*Week Seven:* **Teaching Online**: teaching and learning online; challenges, advantages, and common mistakes; course management systems; engaging students. *Assignment:* online quiz.

*Week Eight:* **Elements of Curriculum Design:** instruction on the steps involved in designing an entire course, a training session, or a single lesson. *Assignment:*  final copy of Teaching Philosophy Statement to include educational theories/strategies from course.

*Week Nine:* **Writing a Syllabus & Reflections on Teaching:** purpose of a syllabus; legal requirements of teaching; student/academic honor codes; student study habits; assigned reading on plagiarism and the purpose of a syllabus. *Assignment:* model syllabus.

Additional requirements include assigned readings and participation in ***ONE*** 45 minute live, online discussion. The instructor will schedule several sessions of live, online discussions and ask you to attend one of these over the course of the class.

**Instructor**

[**Barbara Houtz**](http://stem-k20.com/), **M. Ed.**

CEO, [STEM Education Solutions, LLC](http://stem-k20.com/)

Barbara Houtz is a former Albert Einstein Distinguished Educator Fellow, a science educator, an author of three books on effective teaching strategies in science, a science curriculum developer, and a trainer for K-20 teachers in science, engineering, and literacy. After 13 years of classroom teaching, she moved to the federal government, where she spent several years working at the National Institutes of Health, Office of Science Education, advising on curriculum and teacher professional development for multiple federal research agencies. She spent four years as the Director of Outreach for the Pennsylvania State University’s Eberly College of Science, where she developed multiple educational programs to promote interest in STEM (science, technology, engineering, and mathematics) careers and ensure college and career readiness for K-12 students. Barbara has over 23 years of experience in training educators in both a face-to-face and online environment. Her class on best practices in science education, *Scientists Teaching Science*, has helped thousands of practicing scientists, physicians, engineers, computer scientists, and others learn how to utilize active teaching strategies recommended for effective STEM instruction in nearly every country and field of study.

<http://stem-k20.com/>

<https://www.linkedin.com/in/barbarahoutz>

**Current Hosting Institutions**

**National Institutes of Health, Office of Intramural Training and Education**

Dr. Lori Conlan, Director

Career Services Center

Phone: 301-435-7231

Email: conlanlo@mail.nih.gov

[**The New York Academy of Sciences**](http://www.nyas.org/Subscribe)

Yaihara Fortis-Santiago, Ph.D.

Science Alliance Program Manager

7 World Trade Center, 250 Greenwich St, 40th Fl

New York, NY 10007-2157

Phone: 212 298 8646

Email: yfortis@nyas.org

**University of Puerto Rico, Medical Sciences Campus**

**Minority Biomedical Research Support**

**Research Initiative for Scientific Enhancement**

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**Harvard Medical School**

James Gould, PhD, Director

HMS/HSDM Office for Postdoctoral Fellows

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Email: james\_gould@hms.harvard.edu

**Boston Children’s Hospital**

Lu-Ann Pozzi, PhD, Program Manager

Office of Fellowship Training

Phone: 617-919-2961 or x4-2961

Email: lu-ann.pozzi@childrens.harvard.edu

**Stony Brook University**

**AGEP-T FRAME & IRACDA NY-CAPS**

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**Emory University School of Medicine**

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Director of Career Development

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**Howard Hughes Medical Institute**

**Janelia Research Campus**

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**Select Testimonials from participants in *Scientists Teaching Science***

“I want to say thanks you for providing this very inspiring education course. I just submitted the last assignment and finished all the course content. It was a great experience and literally opened my eye to better educational practices which I didn't know.

“When I started this I was actually not that motivated. I took this because I wanted to earn training history to, say, decorate my CV. But when the course started I noticed how vague I was thinking about education. Many reading materials you provided was all transformative, and I found myself more and more motivated as the course progressed.

“I believe I will be able to educate next-generation scientists far better based on what I learned here. Thanks again, and please keep inspiring more scientists in the future. “ **Takashi Kawashima, PhD, Howard Hughes Medical Institution**

*“After taking the STS course during the summer of 2014, I felt a greater sense of confidence in my teaching ability and immediately began to reorganize my instruction strategy to incorporate newly acquired skills learned by the lessons offered. Barbara Houtz is an excellent educational instructor and the course she has compiled for the STS participants is absolutely unmatched anywhere else. I highly recommend this course if you intend on pursuing a career in education and teaching, whether you’re a graduate student like me thinking ahead or a post-doc.”-* ***Jason L. Quinones, Stony Brook University Medical Center.***

*"Scientists Teaching Science* was my first online course and I loved it. Barbara provided thoughtful guidance and feedback as we developed active learning activities for our students. I will apply these techniques confidently to future courses.

*"STS* armed us with new pedagogical tools and taught us how to develop and implement active learning techniques. I have become a stronger teacher and mentor.

*"STS* empowered me to apply new pedagogical approaches to my courses. I feel confident building a dynamic, engaging learning environment for my future students.

"I gained a tremendous amount of practical information about creating effective, dynamic learning experiences for my students." **Katharine Seip-Cammack, Ph.D., Mount Sinai**

*"Taking the STS course helped me to establish realistic professional goals and guided me in the right direction to actually land a teaching job opportunity. Course content was always relevant. The instructor provided us with a wide variety of teaching styles and she made the course very fun and interactive with a variety of assignments and optional live discussions. This is an outstanding course that anybody interested in teaching at college level should take."*

**Patricia Irizarry, Ph.D.**

**Rutgers Science Explorer Bus - Program Coordinator
Rutgers Geology Museum - Associate Director**

“This class has really helped me to feel more confident and better prepared to move my career forward. I would definitely recommend this class to anyone in STEM fields who are considering becoming teachers or are already teaching science.” ***Itzamarie Chevere, Ph.D. – post-doc at Rutgers University.***

*“The* Scientists Teaching Science *course was so enlightening in how lectures should actually be taught! The traditional method of teaching solely through lecturing to a class does not establish a strong foundation of knowledge that will last long after the course is over. The STS course teaches methods that involve active learning, which is far more sustainable than the traditional teaching methods. With this eras information overload, adjustments in teaching strategies are crucial to keep the attention of students and to deeply engrain the knowledge for future courses. Since taking the STS course, I've been implementing active learning into my teaching with great success. Any teacher desiring to reach their students more profoundly will find this course extremely valuable!”***- NIH Fellow, NIAID**

“Thank you so much for teaching this class. I have to say that I decided to take it on an impulse. As a French post-doc working in Canada, I've had many occasions to feel disoriented by the differences between my birth country and northern American education systems but I didn't know what to expect from an online class about teaching.

“As I am now looking for academic positions in Canada, your course has helped me understand what to expect and most importantly what was expected from me as a science teacher. I now feel more prepared and confident in applying for a position in higher education.

“I found that your course elegantly presented the ins and outs of teaching science as well as the pitfalls. Most of all, I enjoyed the modules about biases - and the discussions it led to - and online teaching which both reach beyond North America and could benefit anybody whatever their origin.

“Now the class is over, I smile at seeing that all the principles and techniques you presented, you applied from the very beginning. It is such a great thing to be taught by someone who believes in what they teach.” **Fabien Hammerer, Ph.D.**

 *“I am very glad to have taken the 'Scientists Teaching Science’ course offered through NYAS in Spring 2016.*

*Advanced teaching skills are important for researchers interested not only in traditional university positions but also as mentors and group leaders in the industry or clinical positions. This course is very immersive. Through a series of assignments and group discussions it familiarized me with the challenges of teaching/mentoring and the latest research on advanced strategies for overcoming them. Divided into modules, each class focuses on diverse aspects of teaching and learning such as design of online or hybrid courses, engaging students in a large class etc. The course director Barbara is a very experienced, enthusiastic and patient. Throughout the course, I received timely, rigorous and detailed feedback on each of my assignments. After taking this course, I have a deep appreciation for the effort that goes into being an effective teacher and designing a syllabus.”* **Malek Adel, Ph.D *,* The Albert Einstein College of Medicine**

 “I did the course online “Scientists Teaching Science” through the New York National Academy of Sciences with Barbara Houtz. The course was very well structured and clear about its goals and objectives. The online course platform was very intuitive and user-friendly, which facilitated to go back and forth in different modules. Each class had supportive documentation and links of web pages to look up for more information in regards to the subject matter. Barbara’s narrations were perfectly clear and easily understood from the viewpoint of a foreigner like me, and besides the narrative presentation, we had also all the narration written in notes which could not be more helpful to study or to go back to when doing the exercises. I have gain full understanding of the all teaching process, since the formulation of a syllabus of a course to attribution of grades to students. Barbara is very approachable and she was also very clear and effective in her corrections and suggestions, which definitely enriched my knowledge and enthusiasm for teaching. It was totally worth to do this course, as it surpassed my expectations in regards to what I was going to learn. I recommend this course to other teachers not only lecturing in USA but in whatever part of the world they are.” **Elisabete Carapuca, Ph.D., Portuguese post-doc working in the UK**

*“****I am a senior researcher and head of a neuroscientific laboratory at the Friedrich-Alexander University of Nuremberg-Erlangen (FAU) in Germany*** *and I decided to take classes in pedagogic strategies in teaching to improve my teaching skills. I was aware about the pitfalls of traditional teachings and I have personal experience of professors failing in creating effective learning approaches to scientific subjects. I dislike replicating that style. Additionally, I am an ambitious person and an ambitious scientist who would love to significantly contribute to the education of the new generation of scientists without compromises.*

*“When I first read about the possibility of learn teaching strategies in an online course – such that of Dr. Barbara Houtz “Scientists Teaching Science (STS)” - I was skeptical. I have never attended online courses before simply because I never trusted them of being able to deliver an effective teaching or being as effective as traditional classes. This was of course a prejudice which proved to be significantly wrong exactly with Dr. Houtz´ course. In fact, the online course itself may not be generally more effective than traditional classes if the teacher cannot handle virtual technologies successfully. Parallel to Dr. Houtz STS course, I have attended an online course on a similar topic and it was not as effective. The skills of a teacher to employ educational technologies can make the difference.*

*“Dr. Barbara Houtz is an amazing professional teacher with a deep knowledge in the theory and application of educational virtual technologies. I simply recommend Dr. Houtz´course “Scientists Teaching Science” to anyone who wants to learn the most important tips and tricks for delivering an effective teaching using modern technologies. Her course is superb and enjoyable and leads you to look forward to use the techniques learnt during the classes. Also, it inspires skills that go beyond the academic applications. It basically set you out to gain a superior communication standard!”* **Davide Amato**

*“The* Scientists Teaching Science *course was so enlightening in how lectures should actually be taught! The traditional method of teaching solely through lecturing to a class does not establish a strong foundation of knowledge that will last long after the course is over. The STS course teaches methods that involve active learning, which is far more sustainable than the traditional teaching methods. With this eras information overload, adjustments in teaching strategies are crucial to keep the attention of students and to deeply engrain the knowledge for future courses. Since taking the STS course, I've been implementing active learning into my teaching with great success. Any teacher desiring to reach their students more profoundly will find this course extremely valuable!”* **Steve Crampton, Ph.D., NIH Fellow, NIAID**

“I attended the 9-week long Scientists Teaching Science Pedagogy Course in 2010 taught by Barbara Houtz, which covered the topics including basic elements of curriculum design, assessment and instructional techniques. The course provided effective teaching strategies and information on best practices in science education in American universities. As an international fellow who was not familiar with the American college teaching, I found that this course helped me a lot in understanding the teaching practicing in American colleges. I believe that this will help me in my future teaching practicing. I found that this course is also particularly useful for me when I started to write a teaching statement for academic job searching. It is an excellent course!” **Zhilong Yang, Ph.D., NIH Fellow, NIAID**

*“Thank you very much for this wonderful class. I have learned a lot by taking this class. The course materials were very informative, accessible, and interesting. The assignments were very practical and to the point. You were able to pass your experience through your notes and comments. This was my first online class. Having had this positive experience with my first online course, I will be very open to take and give online courses. Again, I enjoyed your course.”* **Hani Girgis, Ph.D., NIH Fellow**

“Thanks Barbara and thanks a lot for this course. I really learned a lot from this course and plan to use this in my everyday life. The way I state the objectives in my regular lab presentations for example has definitely changed.” ***Nansi Boghossian, PhD, NIH Fellow***

*“Your recommendations for my teaching talk helped me a lot. It was one of the important decisions in my career to take your STS course. I learned my good things and I am excited for this opportunity to apply these techniques in my classes. I recommend this course to all of my friends. I appreciate your help with reference letters and suggestions during my job search process.“* **Serdar Bozdag, Ph.D., NIH/NCI**

“This is an outstanding course on scientific teaching you provided to NIH postdoc/clinical fellows. The clarity of your presentation and the enthusiasm you imparted about teaching science reflects your unique skills as an instructor. This was the best teaching course I have ever attended. Now, my goal as a teacher is to pass on my love of science to my students and to provide them with both a strong knowledge base as well as the ability to apply that knowledge in their daily lives.

“I wish all postdoc fellows everywhere will be able to take advantage of your skills in teaching this course. You are a special resource and provide a great service to the NIH postdoc/clinical fellows.”**Gezahegn Gorfu Tolla, Ph.D., NIH**