

In Friend of OCW's September 2015 newsletter

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Going Green in Supply Chains



A protest against Nestle over the palm oil plantation controversy is used as a case study in ESD.S43 for students to learn about multi-stakeholder engagements and corporate social responsibilities. (Image courtesy of Philip Reynolds. Used with permission.)

By now, most people are somewhat familiar with the concept of a supply chain, the complex of systems that make it possible for a product to be developed, manufactured, and delivered to customers. In a global economy, many of these activities—extraction of resources, manufacturing, transportation, warehousing—take place in different countries. Understanding supply chains is thus crucial to success of a dynamic, world-wide enterprise.

You don't hear much about how the role good environmental practices can play in supply chains and how they can be implemented to minimize the impact a business has on the planet.

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Friend of OCW, we hope you learned something new or refreshed your memory on a topic you've previously studied.

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Not unless you have explored *ESD.S43 Green Supply Chain Management*, a course that has just published on OCW. This half-semester graduate course . . . “focuses on the fundamental strategies, tools and techniques required to analyze and design environmentally sustainable supply chain systems,” as the course site tells us. “Students work on course-long team projects that critically evaluate the environmental supply chain strategy of an industry or a publicly traded company.”

The course site has six video lectures, selected lecture notes, and a full reading list, consisting largely of case studies.

“These case studies reflect over five years of research completed here at the [MIT Center for Transportation & Logistics](#),” says [Dr. Edgar Blanco](#) on the [This Course at MIT](#) page. “As part of this research, we worked with many companies. I had the opportunity to meet with leaders from these companies who were trying to implement sustainability initiatives. I learned first-hand about the struggles they encountered in this area.”

With co-instructors [Dr. Alexis Bateman](#) and [Professor Anthony Craig](#), Dr. Blanco runs a discussion-based class, challenging students to think for themselves and question their own thinking. Typical questions on case studies include:

How much energy is used and how much carbon is released to make paper towels dispensed in a typical restroom? Would you save energy and release less carbon if an electric hand dryer was used? What factors should be included in such a determination?

Does it make sense to offer obsolete cell



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phones for reuse in other countries? Can this implementation of reverse logistics be sustainable? How?

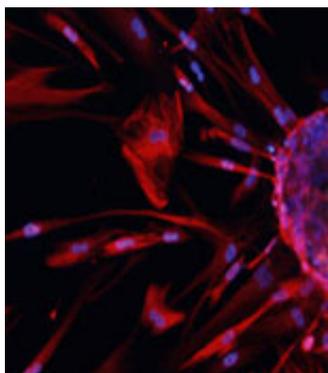
ESD.S43 takes its place on a growing list of [OCW courses on Supply Chains](#). These courses cover a range of topics, including planning and logistics to systems optimization.

People interested in how supply chains are designed should sign up for the edX course [Supply Chain Design](#). But don't delay! The course starts on September 30.

New Courses



[11.139 The City in Film](#)



[7.342 Pluripotent Stem Cells and Genome Engineering for Modeling Human Diseases](#)

- [15.387 Entrepreneurial Sales](#)
- [18.445 Introduction to Stochastic Processes](#)
- [16.55 Ionized Gases](#)
- [WGS.640 Gender, Race, and the Construction of the American West](#)

Updated Courses



[8.591J Systems Biology](#)



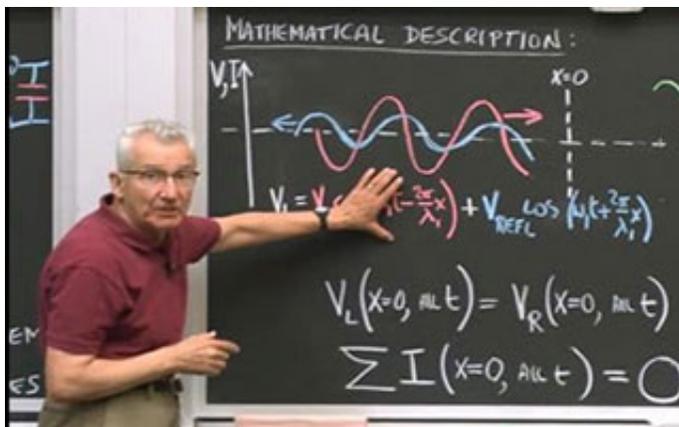
[24.221 Metaphysics](#)

- [18.310 Principles of Discrete Applied Mathematics](#)
- [24.961 Introduction to Phonology](#)
- [10.626 Electrochemical Energy Systems](#)

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OCW Educator



Professor Busza explains how to solve a problem in the video [Traveling Waves without Damping](#)

One of the Greatest Mysteries of Science

“Why do we solve problems?” asks [Professor Wit Busza](#) in the first of his Instructor Insights on the [This Course at MIT page for RES.8-005 Vibrations and Waves Problem Solving](#). “We don’t often explain to students why we solve problems. But shouldn’t we? After all, when you really stop to think about it, the answer to this question is not at all trivial.”

Professor Busza has thought about this question a lot, having taught physics at MIT for many years. In fact, he was honored for his exceptional teaching ability by being made a [MacVicar Fellow](#). His 10 problem-solving videos cover a full range of topics from harmonic oscillators to electromagnetic waves for the course [Physics III Vibrations and Waves](#). Along with each video, Professor Busza has included two sample problems for users to solve. Hints and correct answers are provided, but not full solutions showing all the steps.

In Professor Busza’s view, “The primary reason we solve problems is to experience one of the greatest mysteries of science.” That mystery is twofold: our ability to describe physical situations as mathematical equations, and in solving those equations, to be able to predict what will happen in situations we have never seen before.

So one of his goals as a teacher is to help students learn to “take a given situation, convert it into mathematics, solve it, and predict what will happen. We call that problem solving.”

But students, even at MIT, are often ill-prepared for this challenge, since they “have the preconceived idea that problem solving is the same thing as memorizing equations.” Students tend to get hung up on the mathematics, but in Professor Busza’s experience, it’s the physics that really trips them up:

“Although most students think setting up the problem is trivial, it is actually the hardest part of solving a problem . . . The first thing I do . . . is to ask the student to tell me what the problem is in words. You would be amazed how often the student has not understood what the problem is actually asking. So that's the first thing. It's very useful for the student to draw sketches at this point, then articulate the situation and explain the question being asked.”

And then? “The next step is to ask the student to explain in plain English what he or she would expect to happen. At each step in his or her explanation, [I] ask him or her to state the laws of nature that are playing key roles.” And so are revealed the key areas of misunderstanding.

Of course, the usefulness of problem-solving extends to other areas of physics. In an ideal world, students would be able to pursue the scientific mystery to their heart's content in whatever courses they choose: “Even at the university level, I think students do not have enough opportunities to come full circle in problem solving—that is, to implement experiments to test the accuracy of the predictions they derive from their equations.”

No mystery there!

Highlights for High School



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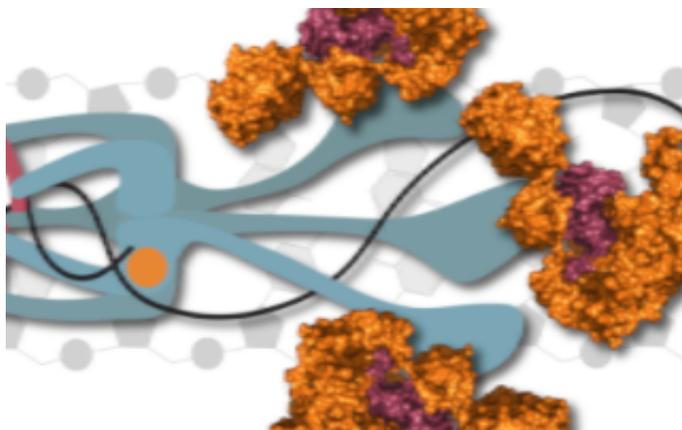
Here's an exam question for you:

For a typical split-brain (= callosotomy) patient, if a picture of a pencil is presented in the right visual field and a picture of a hammer is presented to the left visual field and the patient is asked to identify what had been presented

- A) the patient would say “pencil” and would pick out a hammer from an array of unseen objects with the left hand
- B) the patient would say “hammer” and would pick out a pencil from an array of unseen objects with the left hand
- C) the patient would say “hammer” and would pick out a hammer from an array of unseen objects with the left hand
- D) the patient would say “pencil” and would pick out a pencil from an array of unseen objects with the left hand

You can find the answer in the [9.00SC Introduction to Psychology](#) course. It's one of the many introductory courses in the Highlights for High School [Humanities and Social Sciences](#) collection.

MITx News



Our colleagues at MITx continue their busy fall with seven courses launching on edX.org in the month of October. Here's a sampling of their most intriguing offerings:

6.00.2x Introduction to Computational Thinking and Data Science – starts 10/20

One of MITx's most popular courses, this course helps you take the next step in your computer science education – using programming to solve real-world problems. You'll write your own programs and start learning how to think like a data scientist. If you're one of the thousands of learners who have taken 6.00.1x, you'll enjoy this course!

8.421.2x Atomic and Optical Physics Part 2: Atomic Structure and Atoms in External Field – starts 10/19

This 5-module series explores the cutting-edge field of atomic and optical physics, led by Wolfgang Ketterle, a Nobel Laureate and recent recipient of the [2015 MIT School of Science Teaching Prize for Graduate Education](#) for this course and its companion, 8.422. [Available on OCW as well](#), this is

the first time the course is offered as a MOOC. It's a challenging course – one that is required of PhD-level students at MIT studying this field. If you're ready for it, there's still time to start the first module, which began on 9/21.

7.28.2x Molecular Biology Part 2: Transcription and Transposition – starts 10/27

This fascinating course from MIT's Biology department gives learners a behind-the-scenes look at modern molecular genetics. Learners will explore transcription of DNA to RNA, the first step of gene expression, and find out how scientists discover the details of genetic material. This course uses incredible animations to teach its concepts, and the team recently won an award for a video within the first course of this series. 7.28 is also available on [OCW](#).

You can see the full listing of MITx courses at <https://www.edx.org/school/mitx>.

Views From Our Supporters

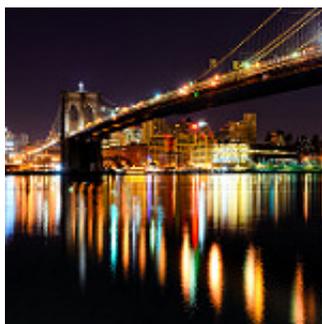


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"I'm determined to teach myself the calculus, linear algebra, statistics and other math used in quantitative finance (and maybe even relativity and quantum mechanics, if I get ambitious).

In my day job I work for an investment firm and I use various multi-factor equity risk models and other risk analytics tools, and I decided a year or so ago to rekindle a youthful aptitude for math and really make an effort to understand what goes on "under the hood" of these models and analytics.

I'm smart enough to realize I can learn more if I let guys like Professor Jerison and Professor Strang teach me, rather than try to teach myself all by myself.

It's been an incredible experience, watching the classroom videos and reading from the books.

I probably could not ace the tests – well, frankly I know I could not -- but I've learned so much already in terms of basic understanding & working knowledge of the topics, in so short a time, that I can hardly believe it.

Keep up the great work!"

- Mark, Independent Learner, USA

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