

MITx

“6.002x Circuits and electronics”

Circuits & Electronics

6.002x

Enroll in 6.002x Circuits & Electronics

6.002x (Circuits and Electronics) is an experimental on-line adaptation of MIT's first undergraduate analog design course: 6.002. This course will run, free of charge, for students worldwide from March 5, 2012 through June 8, 2012.

Autor - Oriol Borrás Gené



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**Gabinete de Tele-Educación
Vicerrectorado de Tecnologías de la Información
y Servicios en Red**

¿Qué es?

Nueva iniciativa del MIT que desde la primavera de 2012 ofrece cursos gratuitos para estudiantes de todo el mundo. Pretende mejorar la experiencia educativa de los estudiantes de sus campus, ofreciendo herramientas online que refuercen y enriquezcan las clases y los laboratorios.

El primer curso ofrecido es “Circuits and electronics” para seguirlo necesario apuntarse, en este formulario:

Enroll in 6.002x Circuits & Electronics

E-mail*

Password*

Username (public)*

Full name*

Location

Preferred Language

I agree to the **Terms of Service***

I agree to the **Honor Code, summarized as:***

- Complete all mid-terms and final exams with only my own work.
- Maintain only one account, and not share the username or password.
- Not engage in any activities that would dishonestly improve my results, or improve or hurt those of others.
- Not post answers to problems that are being used to assess student performance.

About 6.002x

6.002x (Circuits and Electronics) is designed as a first course in an undergraduate electrical engineering (EE), or electrical engineering and computer science (EECS) curriculum. At MIT, it is in the core of department subjects required for undergraduates in EECS.

The course introduces engineering in the context of the lumped circuit abstraction. Topics covered include: resistive elements and networks; independent and dependent sources; switch-level analysis; MOS transistors; digital abstraction; amplifier design; energy storage elements; dynamics of first- and second-order networks; design in the time and frequency domains; and analog and digital communication systems and applications. Design and lab exercises are included.

Anant Agarwal
Director of MIT's Computer Science and Artificial Intelligence Laboratory (CSAIL) and a professor of the Electrical Engineering and Computer Science department at MIT. His research focus is in computer architectures and cloud software. He is a founder of several successful companies including Tiler, a company that produces ARM-based processors. Prof. Agarwal won the Sloan and Jamieson prizes for teaching and authored the course textbook "Foundations of Digital Electronic Circuits."

Gerald Sussman

Ofrecidos en una plataforma online basada en código abierto con una infraestructura escalable que permita en un futuro ir mejorando continuamente y disponible para otras instituciones educativas.

Permite una evaluación individual del trabajo de cualquier estudiante y demostrar a éstos el dominio en una materia para conseguir un certificado de finalización otorgado por el MITx.



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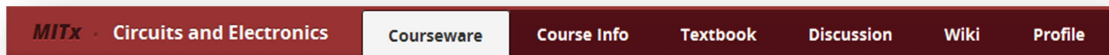


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Circuits and electronics

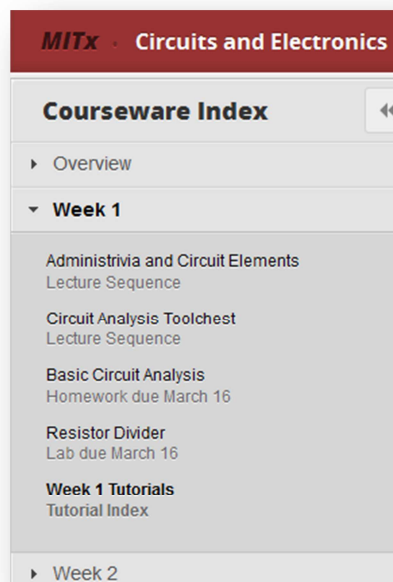
Estructura de un curso

Encontramos una serie de pestañas: Courseware, course info, Textbook, Discussion, Wiki y Profile



1. Courseware

Dentro de esta pestaña aparece a la izquierda un menú con el índice del curso, en este caso: Overview, week 1 y week 2.



Y dentro encontramos una serie de recursos como videos, tutoriales, laboratorios.



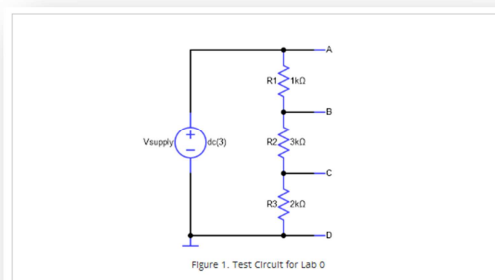
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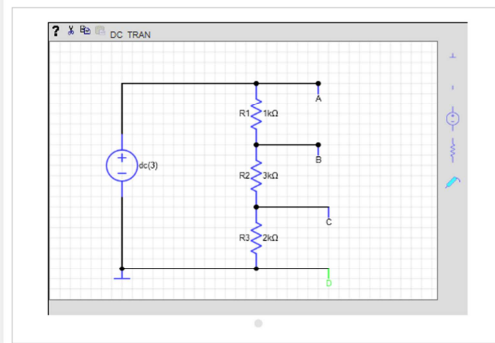
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En el Overview se divide en:

- Una presentación en video de los profesores de la asignatura, con imágenes en clase.
- Presentación del entorno en video y de su funcionamiento.
- Laboratorio inicial de electrónica con práctica de un simulador de circuitos para practicar y conocer el entorno. Autoevaluable.



And here's the interactive tool to be used in the tasks that follow:



En primer lugar la práctica familiariza al alumno proponiéndole un circuito el cual deberá reproducir con la herramienta de simulación, a partir del circuito se van pidiendo valores y se puede comprobar si el resultado es correcto.

A continuación permite en otro simulador mas completo hacer pruebas.

Como ayuda ofrece también un enlace a un video explicativo sobre el funcionamiento del simulador y una guía en pdf.



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Una vez esté el alumno familiarizado con el entorno (overview) pasará a la asignatura dividida en dos semanas “week 1” y “week 2”, en estas se encuentra:

- Constituido por clases en video.
- Ejercicios para casa, en los que el alumno debe realizar circuitos en el simulador y calcular magnitudes. Estos videos van acompañados de un video que explica su resolución.

The screenshot shows a courseware interface for "Circuits and Electronics". On the left is a "Courseware Index" with a tree view showing "Week 1" selected. The main content area displays a video player for "Exercise 6.5". The video player shows a circuit diagram of a MOSFET inverter with a load resistor R_L connected to the drain. The input is labeled "IN" and the output is labeled "OUT". The supply voltage is V_S . The video player includes a progress bar at 0:20 / 2:42 and a speed control set to 0.75x. Below the video player, there is a "SPEAKER 1" transcript that explains the problem and provides a hint: "So this device can either be a 1k resistor or it can be an open. If it's an open, no current can flow. And as a result the power dissipation is zero. And that's when we get power dissipation."

EXERCISE 6.5 Compute the worst-case power consumed by the inverter shown in Figure 6.60. The MOSFET has a threshold voltage $V_T = 2$ V. Assume that $V_S = 5$ V and $R_L = 10$ k Ω . Model the MOSFET using its switch-resistor model, and assume that the on-state resistance of the MOSFET is $R_{ON} = 1$ k Ω .

Exercise 6.5

Explain.

c) Now assume that $R_{ON} = 1$ k and repeat parts (a), (b), and (c).

EXERCISE 6.5 Compute the worst-case power consumed by the inverter shown in Figure 6.60. The MOSFET has a threshold voltage $V_T = 2$ V. Assume that $V_S = 5$ V and $R_L = 10$ k Ω . Model the MOSFET using its switch-resistor model, and assume that the on-state resistance of the MOSFET is $R_{ON} = 1$ k Ω .

EXERCISE 6.6 Consider again the circuit in Figure 6.59. Using the switch-resistor model of the MOSFET, choose minimum values for the various resistors in Figure 6.59 so each circuit satisfies the static discipline with voltage thresholds given by $V_{OH} = V_{DD}/3$ and $V_{OL} = V_{DD}/3$. Assume the on-state resistance of the MOSFET is R_{ON} and that its turn-on threshold voltage $V_T = V_{DD}/9$.

EXERCISE 6.7 Consider a family of logic gates that operates under the static discipline with the following voltage thresholds: $V_{OH} = 0.5$ V, $V_{OL} = 1.6$ V, $V_{OH} = 4.4$ V, and $V_{OL} = 3.2$ V.

a) Graph an open-output voltage transfer function of a buffer satisfying the four voltage thresholds.

b) What is the highest voltage that can be output by an inverter for a logical 0 output?

- Prácticas de laboratorio también con el simulador
- Al final de cada semana viene una sección con diversos tutoriales relacionados con el temario y las actividades de la semana.



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The screenshot shows the MITx Courseware Index for 'Circuits and Electronics'. The 'Week 1' section is expanded, showing a list of items including 'Administrativa and Circuit Elements', 'Circuit Analysis Toolchest', 'Basic Circuit Analysis', and 'Resistor Divider'. The 'Week 1 Tutorials' section is selected, displaying an introduction, basic tutorials (like 'The Circuit Abstraction', 'Lightbulb Circuit', 'Parallel Resistors', etc.), and worked problems (OCW Exercise 1-1, OCW Exercise 1-2, etc.).

2. Course info

Donde van incluyendo información sobre el curso a medida que transcurre éste a modo de tablón de anuncios.

The screenshot shows the MITx Course Info page for 'Circuits and Electronics'. The 'Handouts' section lists various resources like 'Syllabus', '6.002x At-A-Glance (calendar)', 'Staff Listing', 'Math Review', 'Using the Interactive Laboratory', 'How to Use the System', 'How to Use the Question/Answer forum', and 'Lecture 1 Clean Annotated' through 'Lecture 8 Clean Annotated'. The 'Updates' section provides a chronological list of announcements from March 6th to March 19th, detailing course changes, student feedback, and administrative updates.



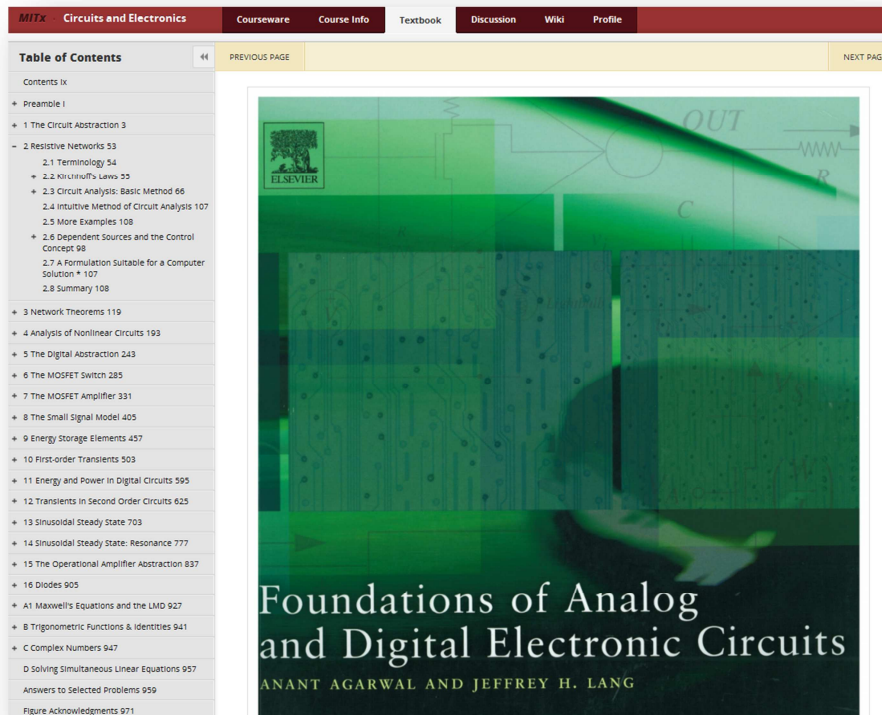
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3. Textbook

Libro de texto completo, con un menú a la izquierda dividido en capítulos.



4. Discussion

Foro del curso en el que plantear preguntas asociándole palabras clave o “tags”. Ofrece información del número de vistas de la pregunta, las respuestas y la puntuación.

A la derecha permite hacer búsquedas, filtrándolas si se desea por palabras clave o incluso ignorar determinados “tags”.



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The screenshot shows a forum interface for a course. At the top, there are navigation tabs: MITx, Circuits and Electronics, Courseware, Course info, Textbook, Discussion, Wiki, and Profile. The main content area displays a list of questions with their respective view, answer, and vote counts. The questions include:

- check results**: 1 view, 0 answers, 0 votes. Text: "Unknown error messages appears everytime that i try to check my results!! don't know what to do/help please!!!"
- Any Hungarians here?**: 71 views, 3 answers, 1 vote. Text: "Hi all! Just trying to find any Hungarians who have enrolled. Maybe we could cooperate. ..."
- Important before you mark down**: 13 views, 1 answer, 0 votes. Text: "Guys, it might seem like a silly topic for many and you might mark me down for it. I hate people mark me down or mark each other down (without a reason). I have not seen any video a..."
- H1P3 PROBLEM UNSOLVED STILL**: 47 views, 3 answers, 0 votes. Text: "I tried my best to solve this problem.I applied all methods to solve the circuit but answer is incorrect,first time when i solved the problem the it came with the correct solutions..."
- S4V9 Static Discipline**: 1 view, 0 answers, 0 votes. Text: "Did anyone else miss that there are questions (S4E1) below the video at S4V9: Static Discipline ? S4V9: Static Discipline and S4E1: Static Discipline are a combined step in the le..."

On the right side, there is a 'Course Discussion' sidebar with options to 'Ask a question', 'View profile (oriolupm)', 'SEARCH QUESTIONS', 'INTERESTING TAGS', 'IGNORED TAGS', 'DISPLAY TAG FILTER', and a 'TAGS' section with various tags like 'feature', 'Lab0', 'Lab1', '5100', 'ctrl', 'admin', 'algebraic', 'answer', 'askbot', 'average', 'basquecountry', 'blockquote', 'branch', 'browser', 'bug', 'c3e3', 'courseware', 'current', 'currentsigns', 'discussion', 'expressions', 'facebook', 'formula', and 'google'.

5. Wiki

Conjunto de artículos en forma de Wiki sobre conceptos estudiados en el curso, permite su edición para fomentar el trabajo colaborativo entre los estudiantes.

The screenshot shows a Wiki page titled 'MIT Circuits and Electronics'. The page is part of a course and includes a search bar, a 'Go!' button, and a 'VIEW' button. The main content area contains the following sections:

- Welcome to the 6.002x Wiki!** This is a collaborative space for students to share their knowledge of the course. You are welcome and encouraged to make edits. There is a wiki page on how to make wiki edits.
- USE THE SANDBOX IF YOU WANT TO USE THE CIRCUIT EDITOR.**
- The circuit diagrams in the wiki do not keep revision changes, so any changes you save will wipe out many HOURS of other people's work and will be considered VANDALISM. Especially if you see a complex circuit DO NOT SAVE ANY CHANGES unless they are relevant to the article and you're also updating the article to reflect the changes.**
- Sequence Notes**
 - Administrivia and Circuit Elements
 - Circuit Analysis Toolchest
 - Basic Circuit Analysis
 - Linearity and Superposition
 - Static Discipline and Boolean Logic
 - (Please add links to your own notes here, and edit/write the notes above as you watch the sequences)
- Laws**
 - Ohm's Law
 - Kirchhoff's Voltage Law
 - Kirchhoff's Current Law
 - Calculating Resistance in Parallel
 - Joule's Law
 - Thévenin and Norton
- Help**
 - Editing the Wiki
 - Error Messages Dictionary
 - Direct page access in course book
 - System Usage
 - Using the Laboratory Tools
 - Discussion FAQ
 - Site Help



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Ejemplo de edición:

The screenshot shows a Course Wiki editor interface. At the top, it says 'Last modified: Mar 06, 2012, 06:13 PM' and has buttons for 'VIEW', 'EDIT', and 'HISTORY'. The main title is 'Ohm's Law'. Below the title, there's a 'Contents:' section. The main text area contains the following content:

Ohm's Law
===
circuit:ohmslaw

In the top 5 in the list of contenders for things that most sound like 'Coleslaw' is, without a doubt, Ohm's Law.

Given any of the Voltage, V (in Volt), Current, I (in Ampere) or Resistance, R (in Ohms), we can calculate any of the others.

But Ohm's Law only applies to devices where the resistance is linear to the voltage, such as a simple resistor, and not much else.

The formula to be used is $V = IR$. That means that for $V = 1 \text{ k}\Omega$ => $I = \frac{V}{R} = \frac{1 \text{ V}}{1 \text{ k}\Omega}$, so the current is 1 mA.

It's quite simple to remember all the formulae associated with Ohm's Law. Just write V above a small line, I and R under it (forming a triangle: $\frac{V}{I} = R$). If you need a formula, just cover the unit you are looking for with a finger and read the formula that is formed by the other units (possibly separated by the line). That means $I = \frac{V}{R}$ and $R = \frac{V}{I}$. If you're having problems remembering, then $V = IR$ can be remembered by simply thinking of a **vir** equation.

At the bottom, there is a 'Description of change:' field, a 'Save Changes' button, and a 'Delete article' link.

On the right side, there is a sidebar with the following content:

This wiki uses **Markdown** for styling. There are several [useful guides online](#).

MITx Additions:

- circuit-basic
- LaTeX Math Expressions

To create a new wiki article, create a link to it. Clicking the link gives you the creation page.

[Article Name][wiki:ArticleName]

Other useful examples:

- [Link](http://google.com)
- Huge Header
- Smaller Header
- *emphasis* or _emphasis_
- **strong** or _strong_
- Unordered List
 - Sub Item 1
 - Sub Item 2
- Ordered List
 - 1. List
 - 2. List

También permite la creación de artículos.

6. Profile

En esta sección se pueden comprobar los avances del curso y qué actividades tiene el alumno pendiente de hacer.

También está la información personal del alumno.



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MITx - Circuits and Electronics Courseware Course Info Textbook Discussion Wiki Profile

Course Progress

100%
A 87%
B 70%
C 60%
0%

HW 01 HW 02 HW 03 HW 04 HW 05 HW 06 HW 07 HW 08 HW 09 HW 10 HW 11 HW 12 HW Avg Lab 01 Lab 02 Lab 03 Lab 04 Lab 05 Lab 06 Lab 07 Lab 08 Lab 09 Lab 10 Lab 11 Lab 12 Lab Avg Midterm Final Total 0%

OVERVIEW

- System Usage Sequence (0/2)**
Lecture Sequence
Practice Scores: **0/1 0/1**
- Lab0: Using the tools (0/12)**
Lab
Practice Scores: **0/12**
- Circuit Sandbox (0/1)**
Lab
Practice Scores: **0/1**

WEEK 1

- Administrivia and Circuit Elements (0/23)**
Lecture Sequence
Practice Scores: **0/3 0/2 0/2 0/3 0/1 0/3 0/2 0/3 0/4**
- Circuit Analysis Toolchest (0/39)**

Oriol Borrás Gene
Forum name: oriolupm
E-mail: oriol.borras@upm.es
Location: Spain
Language: spanish
Password change
Reset Password

viernes, 09 de marzo de 2017

Listado de recursos

Videos

Videos enlazados desde YouTube con la particularidad que presentan un índice a la izquierda de contenidos que se va actualizando a medida que pasa el video y permite acceder a puntos en concreto. En todo momento se marca el punto del índice por el que transcurre el video.



Artificial Intelligence Laboratory or CSAIL.
Like most MIT faculty, I have a wide range of interests, including a fascination around chainsaws.
GERRY SUSSMAN: Hello, I'm Gerry Sussman, professor of electrical engineering at MIT.
Been a faculty member here since 1973.
I build electronics, optics, computer software, and I repair watches as a hobby.
PIOTR MITROS: I'm Piotr Mitros.
I'm a research scientist at MIT, and I was in charge of
As a graduate student, I spent a lot of time traveling around



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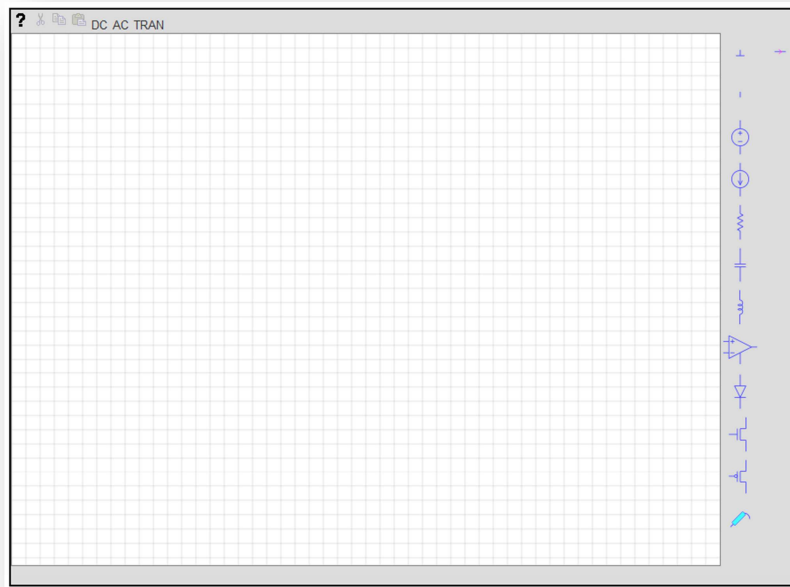


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Estos videos son de clases, resolución de ejercicios o tutoriales.

Laboratorios

Basada en un simulador de circuitos de pruebas.



Calculadora

