Colaboran:

266632 Bi-National Laboratory on Smart Sustainable Energy Management and Technology Training

“Interdisciplinary, Collaborative and Open Innovation to train in Energy Sustainability through MOOCs”

María Soledad Ramírez, Project leader
Silvia C. Farías, MOOC production
Laura Patricia Valdés, MOOC production
Claudia Erika García, MOOC teaching

Monterrey, NL, October 3rd, 2017
Agenda

• Objective and project products
• MOOCs team
• Instructional model
• Results
• Ideas for collaboration
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Objective

• Support the formation of human resources specialized in energy sustainability, and develop human talent with the necessary capabilities to respond to the technological conditions prevailing in the energy value chain (Electric sector), through graduate programs, massive open online courses that will be available nationwide, and validate through competencies certification processes.
Products

- 10 Graduate students
- 12 MOOCs
- 2 Community Workshops
- 2 Books
- 15 Research papers
- 18 Conference participations
- 18 Short term scholar programs
- 1 Web page [http://energialab.tec.mx/](http://energialab.tec.mx/)
- 1 Social innovation lab [http://openergylab.mx/](http://openergylab.mx/)
- 1 Institutional repository with Energy OER
- 12 Technical reports
# MOOC Design and Teaching Time Line

<table>
<thead>
<tr>
<th></th>
<th>2016</th>
<th>2017</th>
<th>2018</th>
<th>2019</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phase 1</td>
<td>4 MOOC design</td>
<td>4 MOOC design</td>
<td>P4</td>
<td>12 MOOC teaching</td>
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<td>4 MOOC teaching</td>
<td>4 MOOC design</td>
<td>P5</td>
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<td>Phase 3</td>
<td>4 MOOC design</td>
<td>8 MOOC teaching</td>
<td>P6</td>
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</table>
Agenda

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### MOOCs team

<table>
<thead>
<tr>
<th>Energy experts</th>
<th>Educational Innovation experts</th>
<th>Teaching and Learning experts</th>
</tr>
</thead>
<tbody>
<tr>
<td>● Research Group on Energy and Climate Change</td>
<td>● School of Humanities and Education</td>
<td>● eLearning team</td>
</tr>
<tr>
<td>● School of Engineering and Sciences</td>
<td>● Graduate students</td>
<td>● Teaching team</td>
</tr>
<tr>
<td>● Business School</td>
<td></td>
<td></td>
</tr>
<tr>
<td>● Expert Guests</td>
<td></td>
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</tbody>
</table>

| 23                                                                            | 11                            | 22                            |

Colaboran:
MOOCs sequence

- General knowledge
- Basic theoretical
- Basic theoretical /experimental
- Advanced/experimental

Energy: past, present & future

The Mexican Energy Reform and its opportunities

Energy Markets: business opportunities

Carbon Markets

The new electric industry in México

Commercialization

Introduction to electric energy

Energy saving

Transmission

Distribution

Smart grid

Colaboran:
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Learners’ profile

+ 17 years old

+ High school

Wants to learn about energy sustainability

Chooses xMOOC as a training program to achieve learning goals

CFE or industry related employees

Colaboran:

[Logos of various organizations]
Instructional model

Networking

Actividades

Recursos

Evaluación

Temas de energía

Gratuita
Masiva
Ubicua
Sin requisitos de admisión

méxico

Aprende (A. Autodirigido)
Practica (A. Significativo)
Interactúa (A. Social)
Demuestra conocimiento
Obtiene su constancia

Colaboran:
Learning path

Página descriptiva

Mensaje de bienvenida  Encuesta de inicio  Forma de trabajo  Autodiagnóstico inicial  Temas del 1 al 5  Examen final  Autodiagnóstico Final  Conclusión
**Educational innovation elements**

1. **Gamification**
   - A question is presented to learners about the content they have studied.
   - Badges are assigned to learners that solve the question based on how many opportunities and how long it took them to finish the exercise.

<table>
<thead>
<tr>
<th>Usuario</th>
<th>Tiempo en contestar</th>
<th>Número de intento</th>
<th>Insignia</th>
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<td>Usuario_2</td>
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Educational innovation elements

Virtual reality

• The use of this type of resources allows learners to interact with concepts and promotes active learning.

• The resources are selected on how they best support the learning experience.
Educational innovation elements

**Augmented reality**

- The use of this type of resources allows learners to interact with concepts and promotes active learning.
- The resources are selected on how they best support the learning experience.
Educational innovation elements

Remote lab

- Learners access the remote lab based at Tecnologico de Monterrey and complete several exercises to practice the concepts they have reviewed in the MOOC.
- There is a limited number of seats, so students have to make a reservation beforehand.
Educational innovation elements

Biometrics

- MOOCs are delivered on MexicoX Platform, which is provided by the Mexican government.
- To this date the platform does not offer the use of biometrics, so this functionality will be tested using an external provider.
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## Phase 2 (Jan-Apr 2017): Enrollments

<table>
<thead>
<tr>
<th>MOOC</th>
<th>Enrolled</th>
<th>Certificates</th>
<th>Completions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conventional &amp; Clean Energy and its Technology</td>
<td>6,022</td>
<td>1,031</td>
<td>17%</td>
</tr>
<tr>
<td>Energy: past, present &amp; future</td>
<td>4,224</td>
<td>646</td>
<td>15%</td>
</tr>
<tr>
<td>The Mexican Energy Reform and its opportunities</td>
<td>4,201</td>
<td>648</td>
<td>15%</td>
</tr>
<tr>
<td>The new electric industry in México</td>
<td>2,763</td>
<td>474</td>
<td>17%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>17,210</strong></td>
<td><strong>2,799</strong></td>
<td><strong>16%</strong></td>
</tr>
</tbody>
</table>
Phase 3 (Sep-Nov 2017): Enrollments

<table>
<thead>
<tr>
<th>Course</th>
<th>Enrollments</th>
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</thead>
<tbody>
<tr>
<td>Introduction to electric energy</td>
<td>3,616</td>
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<tr>
<td>Energy saving</td>
<td>2,920</td>
</tr>
<tr>
<td>Energy Markets: business opportunities</td>
<td>2,780</td>
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<tr>
<td>Conventional, clean Energy and its technology</td>
<td>2,731</td>
</tr>
<tr>
<td>Energy: past, present &amp; future</td>
<td>2,188</td>
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<tr>
<td>The Mexican Energy Reform and its opportunities</td>
<td>2,125</td>
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<tr>
<td>Carbon Markets</td>
<td>2,007</td>
</tr>
<tr>
<td>The new electric industry in México</td>
<td>1,415</td>
</tr>
</tbody>
</table>
Learners’ experience

‘Energy: past, present and future’

I have taken many MOOC across platforms...and few courses I have completed among them this course. When I compare it I find that this course has high quality content, resources are well made and the proposed activities are not only quizzes but more motivating such as networking and the gamification challenge, which help me to apply my knowledge and share it with others.

Regards, Martha Argueta.

‘The Mexican Energy Reform and its opportunities’

I want to congratulate Dr. Luis Alberto Serra Barragán and each and every one of the collaborators by the brilliant integration of content, methodology, and presentation of this course, as well as the Tecnológico de Monterrey for his participation in this educational platform, congratulations.

Joaquín Caballero Vázquez.

Goodnight I would like to thank Dr. Luis Sierra, the teaching staff, MéxicoX platform, and Tecnologico de Monterrey for the present course, certainly is a valuable tool for understanding and learning how to apply the energy reform. Excellent course! Thank you.
Research

- Book “Energy sustainability and Innovation: training with MOOCs and educational research”. (Volume 1).
Research


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Collaboration

• Establish partnerships with UT experts and professors in MOOCs related areas in order to learn from UT experience on designing and teaching MOOCs.

• Participate in short term scholar programs for Tec professors and graduate students at UT.

• Write research papers in conjunction with UT experts.
Esta investigación es un producto del proyecto 266632 “Laboratorio Binacional para la Gestión Inteligente de la Sustentabilidad Energética y la Formación Tecnológica” financiado a través de Fondo CONACYT SENER de Sustentabilidad Energética (S0019201401).

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