



Name of the class: Industrial metabolism
Course key: 76980
Type of course: Optative
Approved credits:
Last curriculum revision date: September 2020
Pre-requisite: None

A) NAME OF THE COURSE: INDUSTRIAL METABOLISM

Synthetic Program				
Industrial Metabolism				
General Information				
Type of curriculum proposal:	New creation	<input checked="" type="checkbox"/>	Restructuration	Adjustment
Type of class	Mandatory	<input type="checkbox"/>	Optative	<input checked="" type="checkbox"/> Complementary
Class shared with another EP or academic entity	(X) No			
	() Yes			
	¿With which PE is shared? _____			
	¿Which semester? _____			
Elaborated by:	Carolin Antoni Noel Armando Colín Mercado			
Reviewed by:	Gadjah Mada University, Indonesia			
Semester	Hours of theory per week	Hours of practice per week	Hours of additional work per week	Credits
	3	1	1	6

Synthetic Program									
General objective	Students will understand the different industrial processes and the flow of matter and energy in the industry, based on the concept of sustainability. In addition, several certifications and audits will be known to ensure sustainable agriculture and industry.								
Specific objective	<ul style="list-style-type: none"> Analyze the current situation of the sustainable industrial context Design projects to improve the sustainable process of the industry 								
Specific professional competence (s) for which the class contributes.	<ul style="list-style-type: none"> Diagnose the problems of the industrial and natural context, in its determinants and organization of public space. Analyze the flow of materials and energy in industrial processes Integrally manage projects in different industries, before the public, social and private sectors Develop a project, including the different audits and certificates 								
Practices of the specific professional competence for which the class contributes	<p>The students :</p> <ul style="list-style-type: none"> They will add their own responsibilities under criteria of quality and relevance to society, and actively contributing to the identification and solution of industrial problems towards sustainability. They will learn through the establishment of coherent and systematized relationships between information derived from experience and conceptual frameworks and explanatory models derived from scientific and technological fields themselves of the profession. 								
Professional transversal (s) competence (s) for which the class contributes	<p>Students will be able to:</p> <ul style="list-style-type: none"> Communicate effectively with others both in writing and orally. Use technical and creative tools to represent research advances. Self-evaluate the research process. Present and defend a research proposal 								
Units	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 30%; background-color: #cccccc;">Units</th> <th style="background-color: #cccccc;">Content</th> </tr> </thead> <tbody> <tr> <td style="background-color: #cccccc;">1. Historical development of industrialization</td> <td>Understand the industrial activity and its development from its origin with the first transformation of raw materials to date.</td> </tr> <tr> <td style="background-color: #cccccc;">2. Industrial processes</td> <td>Understand the need for natural resource flows for industrial processes and improvement towards sustainability.</td> </tr> <tr> <td style="background-color: #cccccc;">3. Legislation</td> <td>To make known the laws, regulations and important norms in the industrial - environmental dynamics .</td> </tr> </tbody> </table>	Units	Content	1. Historical development of industrialization	Understand the industrial activity and its development from its origin with the first transformation of raw materials to date.	2. Industrial processes	Understand the need for natural resource flows for industrial processes and improvement towards sustainability.	3. Legislation	To make known the laws, regulations and important norms in the industrial - environmental dynamics .
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2. Industrial processes	Understand the need for natural resource flows for industrial processes and improvement towards sustainability.								
3. Legislation	To make known the laws, regulations and important norms in the industrial - environmental dynamics .								

Synthetic Program			
	4. Environmental Impact	Understand the impact of industrial processes on social and ecological systems. Also know the studies and certificates to analyze the environmental impact.	
Method and practice	Method	The course will be developed mainly as a seminar-workshop. The main attraction of this method is the possibility of a collective reflection on each of the topics analyzed during the program. The content of the class will be delivered through readings and presentations in class and at home. The course will be dynamic and participatory, based on discussions. In preparation for classes, each student should read a specific article and complete a reading control where they should express their opinion, experiences and thoughts. The teacher also provides conceptual presentations and introduces new topics if it's required.	
	Practice		
Evaluation method	Partial Exam	25%	Pre-readings and essays for unit 1 and 2
		25%	First proposal presentation
		25%	Final essay of the proposal
		25%	Final proposal presentation
	Final exam	The ordinary final grade will correspond to the weighted average of two partial evaluations of the 1st. and 2nd. units with a weighting of 30% each and the final work of the 3rd. unit with a weighting of 40% that added together gives 100%.	
	Other activities		

Bibliography and digital resources	Bibliography	
		<p>CEQ (2000). Environmental impact assessment processes in the United States under NEPA, Council on Environmental Quality's, Nepanet. INE-SEMARNAT.</p> <p>Freeman, Harry M. (1996). Cómo prevenir la contaminación en la industria de la generación de energía. Manual de la prevención de la contaminación industrial, McGraw-Hill/Interamericana editores, Mex</p> <p>Gandy, M.; Rethinking urban metabolism: water, space and the modern city; analysis of urban trends, culture, theory, policy, action; Vol. 8(3):363-379</p> <p>Nieto, A. T. (2017). CRECIMIENTO ECONÓMICO E INDUSTRIALIZACIÓN EN LA AGENDA 2030: PERSPECTIVAS PARA MÉXICO. Problemas Del Desarrollo, 48(188), 83–111. https://doi.org/10.1016/J.RPD.2017.01.005</p> <p>Sun, Q., Li, H., Xyu, B., Cheng, L., Wennersten, R.; 2016; Analysis of the secondary energy in China's iron and steel industry – An approach of industrial metabolism</p> <p>Tanaka, K, 2011, Review of policies and measures for energy efficiency in industry sector; Energy Policy, Vol.39(10):6532-6550</p> <p>Zisopoulos, F., Rossier-Miranda, F.J., van der Goot, A.J., Boom, R.M; 2017; The use of exergetic indicators in the food industry – A review; Critical Reviews in Food Science and Nutrition; Vol.57:197-211</p> <p>Parra, P., Garcés, L., Terán, A., & Vega, N. (2017). Análisis descriptivos de procesos industriales en ingeniería industrial.</p> <p>Amador Soto, G. J. (2019). Control de procesos industriales con minimización del consumo energético. Escuela de Ingeniería Eléctrica y Mecánica.</p>

Synthetic Program		
		<p>Simon, A. (2018). La economía circular del agua: dirección obligatoria. Tecnoaqua, (30), 108-113.</p> <p>Cruz Castro, F. P., Cisneros Huitrón, A., Hernández Díaz, L., Jiménez Herrera, P., & Torres Espinoza, F. I. (2018). Diseño de un modelo de nave industrial sostenible y adaptable para el sector de autopartes en la zona industrial de Puebla.</p> <p>Antúnez Sánchez, A., & Zamora Mayorga, D. J. (2017). La inspección ambiental, la evaluación de impacto ambiental, la autorización ambiental y la auditoría ambiental.</p> <p>Forero, E. A. S. (2018). Industrialización y urbanización en el Estado de México. Convergencia Revista de Ciencias Sociales</p>
	Digital Resources	<p>http://www.stps.gob.mx/bp/secciones/dgsst/normatividad/n152.pdf</p> <p>https://www.profeco.gob.mx/juridico/pdf/l_lfpc_ultimo_camdip.pdf</p> <p>https://ampip.org.mx/wp-content/docs/NMX-R-046-SCFI-2015.pdf</p> <p>http://intranet.upmh.edu.mx/calidad/materialApoyo/ISO/ISO_14001_2015%20Requisitos.PDF</p> <p>http://intranet.upmh.edu.mx/calidad/materialApoyo/ISO/ISO_14001_2015%20Requisitos.PDF</p> <p>https://www.gob.mx/se/</p> <p>http://www.diputados.gob.mx/</p>

B) CONTENTS AND METHODS BY UNITS AND TOPICS

Unit 1. Historical development of industrialization		12 h
Topic 1.1 Past to present		12h
Subtopic	1.1.1 Age of stone, bronze, iron, etc., establishment of agriculture and urbanization 1.1.2 Historical development of the industrialization of consumer goods 1.1.3 Industrial revolution, inducing, technological , geopolitical and environmental factors	
Bibliography and digital resources	Bibliography	Nieto, A. T. (2017). CRECIMIENTO ECONÓMICO E INDUSTRIALIZACIÓN EN LA AGENDA 2030: PERSPECTIVAS PARA MÉXICO. Problemas Del Desarrollo, 48(188), 83–111. https://doi.org/10.1016/J.RPD.2017.01.005
	Digital resources	
Teaching methods	The course will be established primarily as a seminar-workshop; The main attraction of this method lies in the possibility of a collective reflection on each of the topics raised in the program, based on certain key concepts derived from class readings and presentations. The experience of personal reading is reinforced by the synergy of collective reflection.	
Learning activities	Pre-reading activity Conference Interactive discussion Presentation (individual)	

Unit 2 Industrial processes		10h
Topic 2 .1 Industry flows		6h
Subtopic	2.1.1 Water 2.1.2 Energy 2.1.3 D metodologico evelopment for the analysis of the industrial metabolism 2.1.3.1 Matter and energy balances	
Topic 2.2 Sustainable industrial processes		4h
Subtopic	2.2.1. Life cycle analysis 2.2.2 P + L , waste treatment system	
Bibliography and digital resources	Bibliography	2.1.1 Water Gandy, M .; Rethinking urban metabolism: water, space and the modern city; analysis of urban trends, culture, theory, policy, action; Vol. 8 (3): 363-379

		<p>Parra, P., Garcés, L., Terán, A., & Vega, N. (2017). Análisis descriptivos de procesos industriales en ingeniería industrial.</p> <p>Amador Soto, G. J. (2019). Control de procesos industriales con minimización del consumo energético. Escuela de Ingeniería Eléctrica y Mecánica</p> <p>Simon, A. (2018). La economía circular del agua: dirección obligatoria. Tecnoaqua, (30), 108-113.</p> <p>2.1.2 Energy</p> <p>Sun, Q., Li, H., Xyu, B., Cheng, L., Wennersten, R.; 2016; Analysis of the secondary energy in China's iron and steel industry - An approach of industrial metabolism</p> <p>Tanaka, K, 2011, Review of policies and measures for energy efficiency in industry sector; Energy Policy, Vol. 39 (10): 6532-6550</p> <p>Zisopoulos, F., Rossier-Miranda, FJ, van der Goot, AJ, Boom, RM; 2017; The use of exergetic indicators in the food industry - A review; Critical Reviews in Food Science and Nutrition; Vol. 57: 197-211</p>
	Digital resources	
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Learning activities	Pre-reading activity Conference Interactive discussion Presentation (individual)	

Unit 3. Legislation		12 h
Topic 3 .1 Environmental management		12 h
Subtopic	3.1.1 Regulatory framework 3 .1.2 Federal entities	
	Bibliography	Cruz Castro, F. P., Cisneros Huitrón, A., Hernández Díaz, L.,

Bibliography and digital resources		Jiménez Herrera, P., & Torres Espinoza, F. I. (2018). Diseño de un modelo de nave industrial sostenible y adaptable para el sector de autopartes en la zona industrial de Puebla.
	Digital resources	<p>3.1.1 Regulatory framework http://www.stps.gob.mx/bp/secciones/dgsst/normatividad/n152.pdf https://www.profeco.gob.mx/juridico/pdf/l_lfpc_ultimo_camdip.pdf https://ampip.org.mx/wp-content/docs/NMX-R-046-SCFI-2015.pdf</p> <p>3.1.2 Federal entities https://www.gob.mx/se/ http://www.diputados.gob.mx/</p>
Teaching methods	The course will be established primarily as a seminar-workshop; The main attraction of this method lies in the possibility of a collective reflection on each of the topics raised in the program, based on certain key concepts derived from class readings and presentations. The experience of personal reading is reinforced by the synergy of collective reflection.	
Learning activities	Pre-reading activity Conference Interactive discussion Presentation (individual)	

Unit 4 Environmental impact		14 h
Unit 4 .1 Studies and certificates		8 h
Subtopic	4.1.1 Environmental audit 4.1.2 ISO's 4.1.3 Prevent	
Topic 4.2 Processes and dynamics		6 h
Subtopic	4.2.1 Landscape transformations, environmental impacts on the ecosystem 4.2.2 Transformation of society from fossil fuels	
Bibliography and digital resources	Bibliography	<p>4.1.1 Environmental audit CEQ (2000). Environmental impact assessment processes in the United States under NEPA, Council on Environmental Quality's, Napanet. INE-SEMARNAT.</p> <p>Antúnez Sánchez, A., & Zamora Mayorga, D. J. (2017). La inspección ambiental, la evaluación de impacto ambiental, la autorización ambiental y la auditoría ambiental.</p>

		Forero, E. A. S. (2018). Industrialización y urbanización en el Estado de México. Convergencia Revista de Ciencias Sociales. 4.1.3 Prevent Freeman, Harry M. (1996). How to prevent pollution in the power generation industry. Manual of industrial pollution prevention, McGraw-Hill / Interamericana editores, Mex
	Digital resources	4.1.2 ISO's http://intranet.upmh.edu.mx/calidad/materialApoyo/ISO/ISO_14001_2015%20Requisitos.PDF http://intranet.upmh.edu.mx/calidad/materialApoyo/ISO/ISO_14001_2015%20Requisitos.PDF
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C) TEACHING AND LEARNING STRATEGIES

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In preparation for classes, each student should read a specific article and complete a reading control where they should express their opinion, experiences and thoughts. The teacher also provides theoretical presentations and introduces new topics when required.

D) EVALUATION AND ACCREDITATION

Preparation and / or presentation of:	Periodicity	Covers	Weighting of each partial in relation to the ordinary
First partial exam: Oral essay presentation	At the end of Unit 2	Units 1 to 2	25%

Second partial exam: Written essay presentation	At the end of Unit 3	Unit 3	25%
Third partial exam: Final essay presentation	At the end of Unit 4	Unit 4	25%
Final exam	-	-	25%
TOTAL			100 %
Ordinary exam	The final ordinary grade is composed by three partial ratings (60%) and rating the grade of the practical exercise (40%).		
Other academic activities required	Special non-mandatory activities will not have a value in the partial evaluation. This consists of attending special events on the subject or participation as organizers in events of the discipline, whether from the Faculty or outside it as dissemination and training activities		

E) BIBLIOGRAPHY AND DIGITAL RESOURCES

Basic Texts

- CEQ (2000). Environmental impact assessment processes in the United States under NEPA, Council on Environmental Quality's, Nepanet. INE-SEMARNAT.
- Freeman, Harry M. (1996). Cómo prevenir la contaminación en la industria de la generación de energía. Manual de la prevención de la contaminación industrial, McGraw-Hill/Interamericana editores, Mex
- Gandy, M.; Rethinking urban metabolism: water, space and the modern city; analysis of urban trends, culture, theory, policy, action; Vol. 8(3):363-379
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- Sun, Q., Li, H., Xyu, B., Cheng, L., Wennersten, R.; 2016; Analysis of the secondary energy in China's iron and steel industry – An approach of industrial metabolism
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Forero, E. A. S. (2018). Industrialización y urbanización en el Estado de México. Convergencia Revista de Ciencias Sociales

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http://intranet.upmh.edu.mx/calidad/materialApoyo/ISO/ISO_14001_2015%20Requisitos.PDF

<https://www.gob.mx/se/>

<http://www.diputados.gob.mx/>