

**MODULE TEACHING GUIDE**

	<b>1<sup>st</sup> semester</b>
40418	Foundations of ecological economics
40419	Socioenvironmental research methods
40963	Transversal concepts and techniques I
	<b>2<sup>nd</sup> semester</b>
41868	Climate change
41869	Global change
40966	Transversal concepts and techniques II
	<b>3<sup>rd</sup> semester</b>
40967	Industrial Ecology I
40968	Industrial Ecology II
40969	Practicum
	<b>4<sup>th</sup> semester</b>
40970	Thesis

**MODULE TEACHING GUIDE**

**GENERAL DATA OF THE MODULE**

<b>Name</b>	FOUNDATIONS OF ECOLOGICAL ECONOMICS
<b>Code</b>	40418
<b>Course and teaching period</b>	First Semester
<b>Schedule</b>	
<b>Credits ECTS</b>	10
<b>Type of Module</b>	Common of Master <input checked="" type="checkbox"/> Common of speciality <input type="checkbox"/> Optional
<b>Previous requirements to follow the module</b>	-
<b>Teaching language</b>	English
<b>Module responsible</b>	Giuseppe Munda



Universitat Autònoma de Barcelona

<b>Department responsible</b>		Dpt Economia I Història Econòmica		
<b>TEACHING TEAM</b>				
<b>Professor name</b>	<b>Department</b>	<b>Office</b>	<b>e-mail</b>	<b>Tutorials</b>
<b>Giuseppe Munda</b>	Econ.Hist.Econ.	B3-112	<a href="mailto:giuseppe.munda@uab.es">giuseppe.munda@uab.es</a>	
<b>Jeroen van den Bergh</b>	ICTA		<a href="mailto:jeroen.bergh@uab.cat">jeroen.bergh@uab.cat</a>	
<b>Jesús Ramos-Martín,</b>	Econ.Hist.Econ.	B3-112	<a href="mailto:Jesus.Ramos@uab.cat">Jesus.Ramos@uab.cat</a>	
<b>Kozo Mayumi</b>	Visiting professor		<a href="mailto:mayumi@ias.tokushima-u.ac.jp">mayumi@ias.tokushima-u.ac.jp</a>	



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MODULE ESPECIFIC DATA

<p><b>Educational objectives of the Module</b></p>	<p>The course will introduce the field of ecological economics, giving attention to theoretical, empirical and methodological issues. In particular, the course will include an overview of traditional topics of environmental economics and more recent developments within ecological economics.</p> <p>At the end of the course the student is expected to have a good understanding of:</p> <ul style="list-style-type: none"> <li>i) The main themes, theories and methods addressed by ecological economics;</li> <li>ii) The basic literature regarding ecological economics;</li> <li>iii) The essential differences between the way environmental problems and solutions are approached in standard economics and Ecological Economics;</li> <li>iv) New methods that have been proposed by, and are applied within, ecological economics;</li> </ul>	
<p><b>Specific skills of the module</b></p>	<p><b>Skill</b></p>	<p><b>Description</b></p>
	<p>Students will be able to read research articles in ecological economics, and to prepare a research proposal for a master thesis in this field.</p>	
<p><b>Module structure and contents</b></p>	<p>The history of Ecological Economics. Indicators and indices of Sustainability. Environmental macroeconomic accounting. Economics of Resources. Externalities and environmental policy. Cost-benefit analysis compared to Multi-criteria evaluation. Technical change and consumption. Analysis of specific issues (climate change, biodiversity).</p>	
<p><b><u>Teaching methodology</u></b></p>	<p>Readings for each session will be assigned beforehand. Teaching time will be divided between explanation and question time. Students may be asked to prepare written essays too.</p>	
<p><b><u>Evaluation</u></b></p>	<p>Essays and final exam.</p>	
<p><b>Bibliographic and web links</b></p>	<p>Each lecturer will provide key readings for each of the sessions, through the Virtual Campus platform.</p>	



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**MODULE TEACHING GUIDE**

**GENERAL DATA OF THE MODULE:** Transversal concepts and techniques I

Code: 40963

ICTA Seminars in Environmental Science

Environmental Thought

Major Themes in Environmental History

Social Multicriteria Evaluation

GIS

<b>Name</b>	Transversal concepts and techniques I			
<b>Code</b>	40963			
<b>Course and teaching period</b>	First Semester			
<b>Schedule</b>				
<b>Credits ECTS</b>	10			
<b>Type of Module</b>	<b>Common of Master    Common of speciality</b>			
<b>Previous requirements to follow the module</b>	-			
<b>Teaching language</b>	English			
<b>Module responsible</b>	Dr Jesús Ramos			
<b>Department responsible</b>	Dpt Economia i Història Econòmica,			
<b>TEACHING TEAM</b>				
<b>Professor name</b>	<b>Department</b>	<b>Office</b>	<b>e-mail</b>	<b>Tutorials</b>
Agustí Nieto	Filosofia	CEHIC C1/-146	<a href="mailto:agusti.nieto@uab.es">agusti.nieto@uab.es</a>	
Marco Armiero	ICTA	QC-3095	<a href="mailto:marco.armiero@tin.it">marco.armiero@tin.it</a>	
Giuseppe Munda	Economia i Història Econòmica	B3-112	<a href="mailto:Giuseppe.Munda@uab.es">Giuseppe.Munda@uab.es</a>	
Agustí Lobo	ICTA	QC-3105	<a href="mailto:agustin.lobo@ija.csic.es">agustin.lobo@ija.csic.es</a>	



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**JEMES  
TRANSVERSAL CONCEPTS AND TECHNIQUES  
“ICTA Seminars in Environmental Sciences”**

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**About the seminars**

This is a series of seminars that run every Monday at 12:30h organised by ICTA. The contents covers all aspects of environmental studies, from sociology, to economics, technology and engineering. The seminars are advertised in ICTA's website, and students are requested to attend a certain number of them.



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**JEMES**  
**TRANSVERSAL CONCEPTS AND TECHNIQUES**  
**“Environmental Thought”**

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<b>First Semester 2010-11</b> <b>3 ECTS</b>	Agustí Nieto-Galan agusti.nieto@uab.cat CEHIC C1/-146 Facultat de Ciències
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### **About this course**

The course aims to provide an introductory survey of the major issues debated by Western environmentalists over the last century. It examines some aspects of history, philosophy, politics, and culture, as presented or criticized by environmentalists. Through the critical analysis of a selected group of ‘classic’ authors, the course analyses the complex interplay between nature and culture from a humanistic perspective.

### **Lectures and seminars**

The course will be held at the ICTA lecture room. It has 6 sessions (10:00 a.m. to 1:00 p.m. with a break), which combine formal lectures with seminar discussions. Every session will include selected readings and some questions for discussion. Discussion will take place regularly in the first half of every session. Students will prepare short presentations (15 minutes) of specific articles to stimulate discussion.

07-10-10: *Introduction: Nature, culture and the environment*

14-10-10: *Early critics on industrialization*

21-10-10: *Ecological movements and counter culture*

29-10-10: *Women, gender and the environment*

05-11-10: *Recent debates on Environmental issues*

25-11-10: *Seminar. Discussing draft papers*

## **Assessment**

Short presentation of selected papers contributes 20% to final mark.

Long Essay on some aspect of the work of a ‘classic’ environmentalist, contributes 80% to final mark, 3000 words



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### **‘Classic’ environmentalists**

We include among others scholars such as Lewis Mumford, Leo Marx, Donald Kranzberg, Donald Worster, William Cronon, Peter Hay, Dale Jamieson, and John MacNeill; some luminaries of the green movement of the 1960s such as Rachel Carson, Theodore Roszak, and Barry Commoner; founders of eco-feminism such as Carolyn Merchant; and defenders of ‘liberal’ and conservative appropriations of environmentalism, such as Al Gore and Lomborg Bjorn.

### **General Bibliography.**

- BAUER, Martin (ed.) *Resistance to new technology*. Cambridge University Press. Cambridge 1994.
- BOWLER, Peter, *The Fontana History of the Environmental Sciences*. Fontana Press. London 1992. (*Historia Fontana de las ciencias ambientales*. FCE. México 1998).
- BRAMWELL, A., *Ecology in the 20th Century: A History*. Yale Univ. Press. New Haven 1989.
- BRIMBLECOMBE, Peter, *The big smoke: a history of air pollution in London since medieval times*. Methuen, London and New York, 1987.
- CARSON, Rachel, *Silent spring*, London : Hamish Hamilton, 1963 (London : Penguin Books in association with Hamish Hamilton, 1965) (Boston: Houghton Mifflin. 1994, 2002).
- CARSON, Rachel, *Lost woods : the discovered writing of Rachel Carson / edited and with an introduction by Linda Lear* Boston : Beacon, 1998.
- COHEN, Yves, "Scientific Management and the Production Process", in KRIGE, J., PESTRE, D., (eds.) *Science in the Twentieth Century*. Harwood Academic Publishers. Amsterdam 1997. pp. 111-124.
- COMMONER, Barry , *Science and survival*. New York: Ballantine Books, 1970.
- COMMONER, Barry, *The Closing circle: confronting the environmental crisis*. London: Jonathan Cape, 1971.
- COMMONER, Barry, *Making peace with the planet*. New York: Pantheon Books, 1990.
- CRONON, William, *Changes in the land: Indians, colonists, and the ecology of New England*. New York: Hill and Wang, 1983.
- CRONON, William, *Nature's metropolis: Chicago and the Great West*. New York: W.W. Norton & Company, 1992.
- CRONON, William (ed.) *Uncommon ground: rethinking the human place in nature*. New York. W.W. Norton & Company, 1996.
- DUNLAP, Thomas R. (ed.) *DDT, Silent spring, and the rise of environmentalism; classic texts*. University of Washington Press. Washington 2008.
- FEENBERG, Andrew, *Questioning Technology*. Routledge. London and New York 1999.

- FLEMING, James R., GEMERY, Henry A. (eds.) *Science, Technology, and the Environment*. The University of Akron Press. Akron 1994.
- GORE, Albert, *An Inconvenient truth* (film), directed by Davis Guggenheim; produced by Lawrence Bender, Laurie David. United Kingdom: Paramount Home Entertainment, 2006.
- GORE, Albert, *An Inconvenient truth: the planetary emergency of global warming and what we can do about it*. London: Bloomsbury, 2006.
- HAY, Peter, *A Companion to environmental thought*. Edinburgh: Edinburgh University Press, 2002.
- JAMIESON, Dale (ed.) *A Companion to environmental philosophy*. Malden, Mass.: Blackwell, 2001.
- JAMIESON, Dale, and Lori Gruen (eds.) *Reflecting on nature: readings in environmental philosophy*. New York: Oxford University Press, 1994.
- JORDANOVA, Ludmila, PORTER, Roy (eds.), *Images of Earth: Essays in the History of the Environmental Sciences*. BSHS, Bucks 1979.
- KAMIENEICKI, Sheldon (ed.) *Environmental Politics in the International Arena*. State University of New York Press, Albany 1993.
- KRANZBERG, Melvin, "Technology and History: 'Kranzberg's Laws'" a REYNOLDS, T.S., CUTCLIFFE, S.H., (eds.) *Technology and the West. A Historical Anthology from Technology and Culture*. The University of Chicago Press, Chicago 1997. pp. 5-20.
- LOMBORG, Bjorn, *The Skeptical environmentalist: measuring the real state of the world*. Cambridge: Cambridge University Press, 2001.
- LOMBORG, Bjorn (ed.) *Global crises, global solutions*. Cambridge: Cambridge University Press, 2004.
- LEAR, Linda J., "Rachel Carson's Silent Spring", *Environmental History Review*, 17(2), 1993, 23-48.)
- MARX, Leo, *The Machine in the Garden: the Pastoral Ideal in America*. Oxford University Press. New York 1964.
- MARX, Leo; Jill Ker Conway and Kenneth Keniston (eds.) *Earth, air, fire, water: humanistic studies of the environment*. Amherst: University of Massachusetts Press, 1999.
- McCORMICK, J. , *The Global Environment Movement: Reclaiming Paradise*. Indiana Univ. Press. Belhaven 1989.
- McNEIL, Ian (ed.) *An Encyclopedia of the History of Technology*. Routledge. London 1990.
- McNEILL, John, *Something New under the Sun. An Environmental History of the Twentieth Century*. Penguin. London 2000.
- McNEILL, John, and Verena Winiwarter (eds.) *Soils and societies: perspectives from environmental history*. Isle of Harris: White Horse Press, 2006.
- McNEILL, John; Alf Hornborg, and Joan Martinez-Alier (eds.) *Rethinking environmental history: world-system history and global environmental change*. Lanham : AltaMira Press, cop. 2007
- MERCHANT, Carolyn, *Earthcare: Women and the Environment*. Routledge, New York 1996.
- MERCHANT, Carolyn, *The death of nature: women, ecology, and the scientific revolution*. San Francisco: Harper & Row, 1983.
- MERCHANT, Carolyn, *Radical ecology: the search for a livable world*. New York: Routledge, 1992.
- MERCHANT, Carolyn, *Reinventing Eden: the fate of nature in Western culture*. New York : Routledge, 2003.
- MERCHANT, Carolyn; Shepard Krech III, J.R.McNeill (eds.) *Encyclopedia of world environmental history*. New York: Routledge, 2004.



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- MERCHANT, Carolyn, *American environmental history : an introduction*. New York: Columbia University, 2007.
- MILLER, Donald L. (ed.) *The Lewis Mumford reader*. Athens: University of Georgia Press, 1995.
- MUMFORD, Lewis, *Technics and civilization*. New York: Harcourt Brace, 1934.
- MUMFORD, Lewis, *The city in history: its origins, its transformations, and its projects*. London, Secker and Warburg, 1961.
- MUMFORD, Lewis, *The Myth of the machine*. San Diego: Harcourt Brace Jovanovich, 1970.
- MUMFORD, Lewis, *The Future of technics & civilisation*. London: Freedom, 1986.
- NYE, David E. (ed.) *Technologies of Landscape*. The MIT Press. Cambridge MA 1999.
- ROSENBERG, Nathan, *The Economics of Technological Change*. Penguin Books. London 1971.
- ROSENBERG, Nathan, "Technology and the Environment: An Economic Explanation", *Technology and Culture*, 12, 1971, 543-561.
- ROSZAK, Theodore, *The cult of information : the folklore of computers and the true art of thinking*, Cambridge: Lutterworth, 1986.
- ROSZAK, Theodore, *The Making of a counter culture: reflections on the technocratic society and its youthful opposition*. Berkeley : University of California Press, 1995.
- ROSZAK, Theodore, *Person/planet : the creative disintegration of industrial society*. Garden City : Anchor Press/Doubleday, 1978.
- ROSZAK, Theodore, *The Voice of the earth : an exploration of ecopsychology : with a new afterword by Theodore Roszak*. Grand Rapids : Phanes, 2001.
- SHORTLAND. M. (ed.) *Science and Nature. Essays in the History of the Environmental Sciences*. BSHS Monographs. Oxford 1993.
- STINE, Jeffrey K., TARR, Joel A., "Essay: At the Intersection of Histories. Technology and the Environment", *Technology and Culture*, 39 (4), 1998, 601-640.
- STINE, Jeffrey K., TARR, Joel A., *Environmental History Review. Especial Issue on Technology, Pollution and the Environment*. n. 18, 1994.
- WALL, Derek, *Green History. A reader in environmental literature, philosophy and politics*. Routledge, London, New York 1994.
- WORSTER, Donald, "The two cultures revisited: environmental history and the environmental sciences", *Environment and History*, 2(1), 1996, 3-14
- WORSTER, Donald. *Nature's Economy: A History of Ecological Ideas*. Cambridge University Press. Cambridge 1985.
- WORSTER, Donald. *The Ends of the Earth. Perspectives on Modern Environmental History*. Cambridge University Press. Cambridge 1988.
- WORSTER, Donald, *The Wealth of nature: environmental history and the ecological imagination*. New York: Oxford University Press, 1993.



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## **“Major Themes in Environmental History”**

First Semester

3 ECTS

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Instructor: Marco Armiero, Marie Curie Researcher ICTA

Office:

Office Hours: after the sessions, and by appointment.

Phone:

E-mail: [marco.armiero@tin.it](mailto:marco.armiero@tin.it)

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### **About this course**

Environmental History is the study of the ways in which society and nature interact, co-evolving through time. The Environmental History approach is based on a double assumption: on the one side, humans are not the only agency in history, because other forces and living organisms (other species, viruses and bacteria, minerals, gases etc.) act as agents of change, influencing human history as well. On the other side, society and culture deeply influence the ways in which nature ‘works’.

This course will provide an introduction to the discipline as a contribution to overcome the divide between social and natural sciences.



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### **Lectures and seminars**

The course will be held at the ICTA lecture room, in 6 sessions of 3 hours with a break. It combines formal lectures with seminar discussions.

Every session includes selected readings and some questions for debate. Students will prepare short presentations (10 minutes) of specific articles and longer presentation (20 minutes) of their own research projects which will be followed by short questions. After the break, a general discussion will lead to a synthesis of the session.

### **Other activities**

The screening of movies related to the topics of the course

Reading and discussion of a novel linked to the topics

## **1. Lesson**

### **Introduction: What is environmental history? Scopes, sources, methods**

When was environmental history born? Which are its historiographic and cultural roots? What is its subject and methodology?

- 1) D. Worster, Doing environmental history, 289-307
- 2)



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## **2. Lesson**

### **Economic history and the environment**

Stefania Barca

Donald Worster, Dust Bowl, a selected chapter

Myrna Santiago, The Ecology of oil, a selected chapter

## **3. Lesson**

### **Political history and the environment**

Empire, Warfare and Totalitarianism

Alfred Crosby,

John R. McNeill,

Douglas Weiner,

## **4. Lesson**

### **Social history and the environment**

Social struggles and environmental conflicts

Karl Jacoby, Working class environmentalism (48-76)

J. Martinez Alier,

Andrew Hurley, Class, Race and the shaping of an urban landscape (1-14)

## **4. Cultural history and the environment**

Feeling nature

K. Thomas

Simon Schama

Carolyn Merchant

## **5. Urban history and the environment**

Mike Davis

Harvey

Melosi



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## 6. Presentations of research projects

15 minutes oral presentations of draft essays

General discussion:

1. How might we use environmental history in different scientific fields?
2. Can environmental history be useful in the making environmental policies and activism?

## Assessment

**Essay** (3000 words) of 3 selected papers or one book contribute **60%** to final mark.

**Students' research project** (1500-2000 words): each student will write a proposal for a research project, following the frame provided by the instructor. It is strongly recommended to discuss the topic with the instructor. It will contribute **30%** to final mark

**Active participation** (questions, comments, punctuality, etc.) during the class will contribute to the remain **10%** to final mark

**October 21** is the deadline to inform about your choices about the **Essay** and the **Students' research project**. The instructor will help you in organize both works.

**Code of honor:** Copy and paste from internet is totally forbidden. You always must provide full details of the web pages used, if any. You cannot use essays already written for other courses or purposes. Use footnotes.



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**December 13** is the deadline to deliver the final version of your essay.



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## SOCIAL MULTI-CRITERIA EVALUATION

Giuseppe Munda

[Giuseppe.munda@uab.cat](mailto:Giuseppe.munda@uab.cat)

*Social multi-criteria evaluation (SMCE)* is proposed as a tool to integrate *different scientific languages* in a public choice framework, where the whole “*civil society*” and ethical concerns on *future generations* have to be considered along with *policy-makers* and *market conditions*. The main topics tackled in this course are:

### INTRODUCTORY CONCEPTS

What is Multi-Criteria Evaluation?

Social Multi-Criteria Evaluation

Social Multi-Criteria Evaluation and Sustainability Issues

Dealing with a Complex World: Multiple Dimensions, Values and Scales

Technical and social incommensurability

Structuring s SMCE process

Real-world examples

### BASIC MATHEMATICAL CONCEPTS

Preference Modelling in SMCE

Measurement scales

Uncertainty in the criterion scores

Compensability and the Meaning of Weights

The Total Comparability Axiom: Multi-Attribute Value Functions

The Partial Comparability Axiom: Outranking Methods

The Issue of Consistency: Lessons Learned from Social Choice Literature

Examples of software applications

Material to study: Papers in the virtual campus.

Textbook for further readings: Munda G. - *Social multi-criteria evaluation for a sustainable economy*, Operation Research and Decision Theory Series, Springer, Heidelberg, New York, 2008.



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**MODULE TEACHING GUIDE**

	<b>First year</b>
	<b>2nd semester</b>
41868	Climate Change
41869	Global Change
40966	Transversal concepts and techniques II

40966	Transversal concepts and techniques II
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International environmental policy  
 Geographical information systems (GIS) II  
 Techniques of scientific communication  
 Seminars in Environmental Sciences

**MODULE TEACHING GUIDE**

41869	Global change
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Conceptual basis of Global Change and its study taking into account different temporal and spatial perspectives and context. Natural and anthropogenic causes of global change, their impacts, and perception at local level through changes in land-use and landscapes. Anthropogenic alteration of biogeochemical cycles and ecosystems.

<b>Name</b>	Global change
<b>Code</b>	41869
<b>Course and teaching period</b>	spring
<b>Schedule</b>	TBA
<b>Credits ECTS</b>	10
<b>Type of Module</b>	<input checked="" type="checkbox"/> Common of Master <input checked="" type="checkbox"/> Common of speciality <input type="checkbox"/> Optional
<b>Previous requirements to follow the module</b>	
<b>Teaching language</b>	English
<b>Module responsible</b>	Graham Mortyn
<b>Department responsible</b>	Geography

**TEACHING TEAM**

Professor name	Department	Office	e-mail	Tutorials
Graham Mortyn	Geography		graham.mortyn@uab.es	
<b>Toni Rosell</b>	Geography		antoni.rosell@uab.es	
<b>David Molina</b>	Geography		david.molina@uab.es	
<b>Marti Boada</b>	Geography		patrizia.ziveri@uab.es	
<b>Sergio Rossi</b>	Geography		<a href="mailto:Sergio.rossi@uab.es">Sergio.rossi@uab.es</a>	
<b>Pere Masque</b>	Física		pere.masque@uab.cat	

<b>Patrizia Ziveri</b>	ICTA		Patrizia.ziveri@uab.cat	
<b>Rainer Zahn</b>	ICTA		Rainer.zahn@uab.cat	

#### MODULE ESPECIFIC DATA

<b>Educational objectives of the Module</b>	<p>At the end of the module, the student will be capable of:</p> <p><i>Understanding and explaining many of the types of impacts related to global change, covering a variety of spatial and temporal timescales. They will be able to discern changes and impacts caused by climate vs. those with other forcing mechanisms. They will focus their studies and efforts on changes in land use, biodiversity, the global carbon cycle, and ecosystem impacts and repercussions. Both terrestrial and marine systems will be explored.</i></p>	
<b>Specific skills of the module</b>	<b>Skill</b>	<b>Description</b>
	<b>explain climate vs. other causes</b>	<b>clear distinction between climate vs. other driving forces of impact and change</b>

<p><b>Module structure and contents</b></p>	<ol style="list-style-type: none"> <li>1. Historical perspective of global change: what is climate and what is not? A thorough analysis of the distinctions between climate and global change from a variety of past timescales.</li> <li>2. The modern ocean and ways in which impacts are delivered and observed. Issues to be addressed include seawater composition, air-sea interaction, ocean circulation, and marine biological productivity.</li> <li>3. Global change and ecosystems impacts, with focus on the marine environment. A more detailed analysis of whole marine ecosystems, including phytoplankton on up to highest trophic levels. Particular emphasis on fisheries.</li> <li>4. Global change and ecosystems impacts, with focus on local terrestrial environment. Local terrestrial impacts will be explored in detail, with particular emphasis on land use changes and recent human influences. Terrestrial carbon cycling will be deciphered through analysis of vegetation and ecosystem systems.</li> <li>5. The module will include a 3-day field trip to the Catalan Pyrenees Mts., in order to explore first-hand local impacts and land use changes as functions of global change processes.</li> </ol>
<p><b>Teaching methodology</b></p>	<p><i>Teaching and discussions will occur during class times, guided by particular readings assigned by individual instructors. There will also be a field trip to the mountainous regions of Catalonia led by 2 of the instructors.</i></p>
<p><b>Evaluation</b></p>	<p>There will be evaluations based on a short answer / essay exam at the end of the module, as well as a short research paper.</p>
<p><b>Bibliographic and web links</b></p>	<p>To be provided by individual instructors as the course proceeds.</p>

### **MODULE TEACHING GUIDE**

41868	Climate Change
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Patterns, causes and mechanism of natural climate change. Impact of human activities in the present climate dynamics, and possible future scenarios. Tools and approaches to study the climate system.

### DADES GENERALS DEL MÒDUL

Code	Climate Change
Course and teaching period	41868



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<b>Schedule</b>				
<b>Credits ECTS</b>				
<b>Type of Module</b> 10				
<b>Previous requirements to follow the module</b>				
<b>Teaching language</b>				
<b>Module responsible</b> English				
<b>Department responsible</b> Antoni Rosell				
<b>Code</b> ICTA				
<b>EQUIP DOCENT (afegiu més fileres si és el cas)</b>				
<b>Nom professor</b>	<b>Departament</b>	<b>Despatx</b>	<b>e-mail</b>	<b>Horari tutories</b>
<b>Pere Masqué</b>	Física	C5-430	<a href="mailto:Pere.Masque@uab.es">Pere.Masque@uab.es</a>	a concertar
<b>Graham Mortyn</b>	Geografia	C3p-4a planta	<a href="mailto:Graham.Mortyn@uab.es">Graham.Mortyn@uab.es</a>	a concertar
<b>Antoni Rosell</b>	ICTA	C3p-4a planta	<a href="mailto:Antoni.Rosell@uab.es">Antoni.Rosell@uab.es</a>	a concertar
<b>Sergio Rossi</b>	ICTA	C5/424p-4a planta	<a href="mailto:Sergio.Rossi@uab.cat">Sergio.Rossi@uab.cat</a>	a concertar
<b>Rainer Zahn</b>	ICTA	C3p-4a planta	<a href="mailto:Rainer.Zahn@uab.es">Rainer.Zahn@uab.es</a>	a concertar
<b>Patrizia Ziveri</b>	ICTA	C3p-4a planta	<a href="mailto:JosepPatrizia.Ziveri@uab.es">JosepPatrizia.Ziveri@uab.es</a>	a concertar



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### **MODULE TEACHING GUIDE**

	<b>1<sup>st</sup> semester</b>
40418	Foundations of ecological economics
40419	Socioenvironmental research methods
40963	Transversal concepts and techniques I
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41868	Climate change
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40967	Industrial Ecology I
40968	Industrial Ecology II
40969	Practicum
	<b>4<sup>th</sup> semester</b>
40970	Thesis

### **MODULE TEACHING GUIDES FOR THIRD SEMESTER**

40967	Industrial Ecology I
40968	Industrial Ecology II
40969	Practicum



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## GENERAL DATA OF THE MODULE

<b>Name</b>	Gara Villalba			
<b>Code</b>	40968			
<b>Course and teaching period</b>	Industrial Ecology Module II: third semester			
<b>Schedule</b>	See attached schedule			
<b>Credits ECTS</b>	10			
<b>Type of Module</b>	Common of Master <input checked="" type="checkbox"/> Common of speciality <input type="checkbox"/> Optional			
<b>Previous requirements to follow the module</b>				
<b>Teaching language</b>	English			
<b>Module responsible</b>	Gara Villalba			
<b>Department responsible</b>	Dept. of Chemical Engineering			
<b>TEACHING TEAM</b>				
<b>Professor name</b>	<b>Department</b>	<b>Office</b>	<b>e-mail</b>	<b>Tutorials</b>
Gara Villalba	Chemical eng.	ETSE 1133	Gara.villalba@uab.cat	Previous appointment
Maria Rosa Rovira	Business Economics	QC/3105	Mariarosa.Rovira@uab.cat	Previous appointment
Joan Rieradevall	ICTA	ETSE	Joan.rieradevall@uab.cat	Previous appointment
Assumpció Anton	IRTA	IRTA	assumpcio.anton@irta.es	Previous appointment
Carles Martínez	Inèdit	IRTA	carles@ineditnova.com	Previous appointment
Juan I. Montero	IRTA	IRTA	juanignacio.montero@irta.es	Previous appointment
Pere Muñoz	IRTA	IRTA	Pere.munoz @irta.es	Previous appointment



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MODULE ESPECIFIC DATA

<p><b>Educational objectives of the Module</b></p>	<p>This course will be an introduction to the origin of Industrial Ecology as a multidisciplinary effort, as well as its methods, tools, and strategies aimed to recreate our industrial system in such a way that it can be sustainable and in harmony with the rest of the natural ecosystem. Besides this theoretical overview, big emphasis will be given to:</p> <ul style="list-style-type: none"> <li>• <i>Material flow analysis</i></li> <li>• <i>Life cycle analysis</i></li> <li>• <i>Agricultural life cycle analysis</i></li> <li>• <i>Sustainable Energy systems</i></li> </ul>	
<p><b>Specific skills of the module</b></p>	<p><b>Skill</b></p>	
	<p><b>Introduction to Industrial Ecology:</b> -learn about different tools of Industrial Ecology and be able to apply them to systems at different levels.</p>	
	<p><b>Corporate social responsibility (CSR)</b> -Understanding corporate social responsibility and the international reporting tool for reporting Global Reporting Initiative (GRI).</p>	
	<p><b>Agricultural LCA:</b> -better knowledge of intensive horticulture -identify factors with high environmental impact in the agricultural production systems</p>	
	<p><b>Product LCA:</b> -interpret and perform life cycle analysis for products and systems -know how to use other methods such as ecoefficiency and ecodesign, ecoparks, and how to integrate these concepts in LCA -use SimaPro to perform LCA</p>	

<p><b>Module structure and contents</b></p>	<p>For Introduction to Industrial Ecology:</p> <ol style="list-style-type: none"> <li>1. Industrial Ecology and Technological change. Introduction to the course, objectives and expectations. A general introduction to the concepts of IE, its framework as a multidisciplinary area of research.</li> <li>2. Concepts from economy, a vision of resources. In class we will do a game where we learn about marginal costs, carbon emission allocations, and country politics.</li> <li>3. System Theory. A brief introduction to systems theory. Thermodynamics as a conceptual framework for IE.</li> <li>4. Material Flow Analysis.</li> <li>5. Introduction to social metabolism and methods. Eurostat guide for MFAs, resources and methods, including estimation methods. We will start a MFA exercise in the computer lab.</li> </ol> <p>For product and process LCA</p> <ol style="list-style-type: none"> <li>1. Regulations and legal framework</li> <li>2. Definition of objectives, functional unit, and inventory.</li> <li>3. Impact evaluation and improvement analysis</li> <li>4. Problems associated with LCA, future objectives</li> <li>5. case studies: products and processes</li> <li>6. Introduction to SimaPro 6.0</li> </ol> <p>For agricultural LCA:</p> <ol style="list-style-type: none"> <li>1. Introduction to intensive horticulture</li> <li>2. How to identify factors with high environmental impact in the agricultural production systems.</li> </ol> <p>For Corporate social responsibility (CSR) accounting and reporting</p> <ol style="list-style-type: none"> <li>1. Introduction to CSR</li> <li>2. Environmental management accounting</li> <li>3. Sustainability reporting: Global Reporting Initiative (GRI)</li> </ol>
<p><b>Teaching methodology</b></p>	<p>Teaching and discussions will occur during class times, guided by particular readings and exercises. Some classes will be given in computer labs, and will have follow-up exercises.</p>
<p><b>Evaluation</b></p>	<p>Evaluation will be done separately by each professor, but in general, evaluation will be based on: assistance to class, class projects, and class exercises. The final grade for the module will be calculated as follows:</p> <p><b>Introduction to Industrial Ecology: 45%</b>  <b>Corporate social responsibility (CSR): 15%</b>  <b>LCA theory (includes agricultural): 40%</b></p> <p><b>A minimum of 3.5 is needed in each of the three topics in order to pass.</b></p>
<p><b>Bibliographic and web links</b></p>	<p>Available from class syllabus from each professor separately.</p>

## MODULE TEACHING GUIDE

### GENERAL DATA OF THE MODULE

<b>Name</b>	Industrial Ecology I			
<b>Code</b>	40967			
<b>Course and teaching period</b>	Third semester			
<b>Schedule</b>	See attached schedule			
<b>Credits ECTS</b>	10			
<b>Type of Module</b>	Common of Master <input checked="" type="checkbox"/> Common of speciality <input type="checkbox"/> Optional			
<b>Previous requirements to follow the module</b>				
<b>Teaching language</b>	English			
<b>Module responsible</b>	Montserrat Sarrà			
<b>Department responsible</b>	Dept. of Chemical Engineering			
<b>TEACHING TEAM</b>				
<b>Professor name</b>	<b>Department</b>	<b>Office</b>	<b>e-mail</b>	<b>Tutorials</b>
Xavier Gabarrell	Chemical Eng	QC/1087	Xavier.gabarrell@uab.cat	Previous appointment
David Gabriel	Chemical Eng		David.gabriel@uab.cat	Previous appointment
Montse Sarrà	Chemical Eng	QC/1087	Montserrat.Sarra@uab.cat	Previous appointment
Lidia Lombardi	Dipartimento di Energetica "Sergio Stecco"	Universita' degli Studi di Firenze		
Maria Frangou	ICTA		Maria.Frangou@uab.cat	Previous appointment
Maria Rosa Rovira	Business Economics	QC/3105	Mariarosa.Rovira@uab.cat	Previous appointment
Antoni Sanchez	Chemical Eng		Antoni.Sanchez@uab.cat	



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MODULE ESPECIFIC DATA

<p><b>Educational objectives of the Module</b></p>	<p>At the end of the module, the student will be capable of:</p> <ul style="list-style-type: none"> <li>- Choosing and proposing the most suitable management system for an industrial waste according the actual legislation.</li> <li>- Use adequately the European Decision 2000/532/EC, that establishes a single community list which integrates all the waste.</li> <li>- Proposing a municipal waste management plan for a fixed zone.</li> <li>- Proposing a logic sequence for automatic classification of the fractions of the municipal solid waste.</li> <li>- Evaluating the possibility to apply a biological treatment for a waste according to its characteristics.</li> <li>- Proposing an organic waste valorization system.</li> <li>- Obtaining and synthesizing actual information from the specialized bibliographic sources related to biologic wastewater treatment.</li> <li>- Analyzing the performance of a biologic wastewater treatment plant (WWTP) and proposing improvement and correction actions.</li> <li>- Evaluating the main impact of a landfill</li> <li>- Analyzing the main characteristics of the composting process design and performance.</li> <li>- Analyzing the main characteristics of the bioreactors design and performance for residual gases and odors.</li> <li>- Understanding corporate social responsibility and the international reporting tool for reporting Global Reporting Initiative (GRI).</li> </ul>
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**Module structure and contents**

**Bloc 1. Industrial waste management**

1.1. Industrial waste management

- General context: economic indicators
- Waste legislation: definition, priorities, European, Spanish and Catalan. Definitions.
- Industrial wastes: management, specific cases: Catalonia, Netherlands and Portugal

1.2. General concepts of the industrial waste management

- List of wastes, CRC, involved actors, waste producers.
- Hazardous properties
- Management models.

**Bloc 2. Municipal waste management**

2.1. General overview: waste production, composition, properties, environmental impacts, legislation

2.2. Collecting systems and related sustainability indexes.

2.3. Management plan

2.4. Processing plants:

- General overview of the available technologies
- Description of the several plants
- Characteristics of the main unit operations involved

2.5 Recyclable materials

2.6. Landfills

**Bloc 3. Aerobic depuration of wastewater (\*)**

3.1. Introduction. WWTP context. Legislation, management and organization.

3.2. Wastewater characterization: (analysis and respirometry)

3.3. WWTP schemes. Pretreatment and sedimentation design. Reactors dimensioning and designing. Organic material removal.

3.4. Dimensioning and designing of aerated systems.

3.5. Economic balance: WWTP exploitation costs.

3.6. Control and instrumentation of a WWTP.

4.7. Activated sludge process modelisation.

**Bloc 4. Composting organic wastes (\*)**

4.1. General aspects related to management and treatment of organic solid wastes. Legislation. Biodegradability

4.2. Scientific fundamentals of the composting process.

4.3. Operation of the industrial composting process

4.4. Composting plant typologies.

4.5. Composting in Catalonia

4.6. Several related experiences and plant visit

**Bloc 5. Biological treatment of gases and odors**

5.1. Fundamentals: emissions (type, characteristics, legislation), sampling and measurement

5.2. Bioreactors for residual gases and odors treatment.

- Fundamentals of the bioreactors.
- Biofilters and percolating biofilters: operation and design of equipments
- Economic aspects of the gas treatment
- Comparing to physic-chemical treatments
- Case study and evaluation

5.3. Modelization of film bioreactors

- General aspects of the mathematical modelisation

	<ul style="list-style-type: none"> <li>• Unidimensional models for fixed bed bioreactors.</li> <li>• Simulation practical sessions</li> <li>•</li> </ul> <p><b><u>Bloc 6. Corporate social responsibility (CSR) accounting and reporting</u></b>          6.1. Introduction to CSR          6.2. Environmental management accounting          6.3. Sustainability reporting: Global Reporting Initiative (GRI)</p> <p>(*) Adapted blocs depending of the previous background of students</p>
<p><u>Teaching methodology</u></p>	<p>The main teaching methodology will be through lectures (approximately 65 hours) but discussions will occur during class times, guided by particular readings and exercises. Some classes will be given in computer labs, and will have follow-up exercises. Several visits to industrial installations will be proposed.</p>
<p><u>Evaluation</u></p>	<p>Evaluation will be done separately by each professor, but in general, evaluation will be based on: assistance to class, class projects, class exercises and short exams.</p>
<p><u>Bibliographic and web links</u></p>	<p>-Bilitewski, B., Härdtle, G., Marek, K., Weissbach, A., Boeddicker, H. Waste management. 1997. Springer (Germany).</p> <p>- LaGrega, Michael D., Buckingham, P. L., Evans, J. C. "Hazardous waste management" McGraw-Hill, cop., New York 1994.</p> <p>-Lund, H. F., Manual McGraw-Hill de reciclaje. McGraw-Hill/Interamericana de España. 1996. (Madrid). (English version too)</p> <p>-Tchobanoglous, G., Theisen, H., Vigil, S. Gestión integral de residuos sólidos. McGraw-Hill. Madrid (1994).</p> <p>-Landreth, R. E., Rebers, P. A. Municipal Solid Wastes. Problems and Solutions. CRC Press, Inc., 1997. (USA)</p> <p>-Devinny JS, Deshusses MA, Webster TS. "Biofiltration for air pollution control". 1999. CRC. Lewis Publishers. Boca Raton, Florida, EEUU</p> <p>- Freeman H.M., "Standard handbook of hazardous waste treatment and disposal". 2ona ed., 1997 McGraw-Hill.</p> <p>- Haug, R.T. "The practical handbook of compost engineering." 1993. Lewis Publishers (Boca Raton)</p> <p>-Kennes C, Veiga MC. "Bioreactors for waste gas treatment". 2001. Kluwer Academic Publishers. Dordrecht, Holanda</p> <p>- Stuetz R. and F.B. Frechen. "Odours in Wastewater Treatment: Measuring, Modelling and Control" 2001 International Water Association Publishing, London.</p> <p>- Water Science and Technology. (2001) vol 44 n°8. IWA Publishing. UK</p>

	<p>- Scientific and Technical Report No 10. Sequencing Batch Reactor Technology (2001). Edited by P. Wilderer, R. Irvine and M. Goronsky. ISBN: 1 900222 21 3. Published by IWA Publishing, Cornwall (UK).</p> <p>-Fifth Specialised Conference on Small Water and Wastewater Treatment Systems (2002). Volume II. Editors: I. Ozturk and A. Tanik. ISBN: 975-561-226-2. Istanbul (Turkey).</p> <p>- Dillard, J. (2009), An Ethic of Accountability, <i>Research on Professional Responsibility and Ethics in Accounting</i> (forthcoming).</p> <p>- <a href="http://www.awwa.org">http://www.awwa.org</a> American Water Works Association. Journal AWWA.</p> <p>- <a href="http://www.eea.eu.int">http://www.eea.eu.int</a> Agència Europea del Medi Ambient</p> <p>- Agència de Residus de Catalunya, <a href="http://www.arc-cat.net">www.arc-cat.net</a>.</p> <p>- Centre per a l'Empresa i el Medi Ambient, <a href="http://www.cema-sa.org">www.cema-sa.org</a>.</p> <p>- Global Reporting Initiative (GRI) <a href="http://www.globalreporting.org">http://www.globalreporting.org</a></p>
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### MODULE TEACHING GUIDE

#### GENERAL DATA OF THE MODULE

<b>Name</b>	Practicum			
<b>Code</b>	40969			
<b>Course and teaching period</b>	Third or fourth semester			
<b>Schedule</b>	To be determined by the hosting institution			
<b>Credits ECTS</b>	10			
<b>Type of Module</b>	Common of Master <input checked="" type="checkbox"/> Common of speciality <input type="checkbox"/> Optional			
<b>Previous requirements to follow the module</b>				
<b>Teaching language</b>	English/Spanish/Catalan			
<b>Module responsible</b>	Xavier Gabarrell			
<b>Department responsible</b>	Department of Chemical Engineering			
<b>TEACHING TEAM</b>				
<b>Professor name</b>	<b>Department</b>	<b>Office</b>	<b>e-mail</b>	<b>Tutorials</b>
Xavier GAbarrell	Chemical Engineering	QC-1145	Xavier.gabarrell@uab.cat	



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MODULE ESPECIFIC DATA

<p><b>Educational objectives of the Module</b></p>	<p><i>At the end of the module, the student will be capable of:</i></p> <ul style="list-style-type: none"> <li>- Start working in a public or private research institution or of a public or private company with a basic knowledge of the habits and way of work</li> </ul>	
<p><b>Specific skills of the module</b></p>	<p><b>Skill</b></p>	<p><b>Description</b></p>
	<ul style="list-style-type: none"> <li>- Organization</li> <li>- Teamwork</li> <li>- Overall view</li> <li>- Specific skills</li> </ul>	<ul style="list-style-type: none"> <li>- To learn about the work is organized and how to organize himself at work</li> <li>- To learn about teamwork with other professionals</li> <li>- The student will gain an overall view of environmental topics that affect the research or professional work</li> <li>- The student will learn the specific tasks and capabilities of the job developed in the hosting institution</li> </ul>
<p><b>Module structure and contents</b></p>	<ul style="list-style-type: none"> <li>- The value of the credits obtained by the student are those detailed in the module</li> <li>- To calculate the amount of dedication (in hours) that the student has to dedicate to the hosting institution one has to take into account that the minimum number of hours per credit is 25, while the maximum is 30</li> <li>- The practicum does not imply any obligation to the hosting institution nor the university except for those strictly academic. In any case, no job relationship can be ascribed between the student and the hosting institution</li> <li>- Practicum students are covered by the scholar insurance according to actual regulation</li> <li>- Students that due to legal limitations are not covered by the scholar insurance will be required to present supporting documents demonstrating coverage through any other assistance</li> </ul>	
<p><b>Teaching methodology</b></p>	<p><i>Students will be enrolled in the hosting institution system in terms of working hours and working needs. Prior to the start, a registration file will be fulfilled where the tasks to be performed by the student will be detailed.</i></p> <p><i>During the last week of the Practicum period, the student will present a short report describing its activity along the Practicum period</i></p>	
<p><i>Evaluation will be performed according to the following marks:</i></p>		



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<b><u>Evaluation</u></b>	<ul style="list-style-type: none"><li>- 50% by the student responsible at the hosting institution</li><li>- 50% by the university tutor according to the report presented and its considered opinion</li></ul>
<b>Bibliographic and web links</b>	

## **Practicum Instructions**

This activity consists in a short stay of the student in a hosting institution (public or private research institution or in a public or private company) to obtain a basic knowledge of the habits and way of work. Such stays are academically recognized through credits and need of an Agreement signed between the University and the hosting institution.

**Agreement for the undertaking of practicums for obtaining academic credits** is a MUST that provides recognition of academic credits and can qualify students for the JEMES Master that enrolled the Practicum module. The management of this agreement takes place in the Administration of the Faculty of Sciences prior completion of an **Activity Proposal form**. The Annex section shows a model of such agreement and the Activity Proposal form.

As **important information and recommendations** known to setup such agreements include:

- The Practicum commitment is between 250 and 300h according to the registered module, which must be compatible with other teaching activities (exams, class, delivery of practical work) during the teaching period.
  - There is no obligation of the hosting institution to financially reward students. Such initiative is only part of the company and do not need to be reflected in the agreement.
  - The student is covered by medical insurance.
  - Practicum can be performed in Spain or abroad. However, a case by case analysis will be done by the academic tutor to authorize the Practicum.
  - Erasmus Mundus students cannot perform the Practicum in their country of origin. Any exception will be previously assessed at the EAE commissioned.
  - If the hosting institution in Spain is a private or public company, students must be fluent in Spanish or Catalan.
  - There is not a specific list of companies/institutions. Because of the short Practicum period (250h) and the language limitation, students are encouraged to enrol the practicum in the same hosting institution where they will perform their Master Thesis. In this case, the first 250-300h of their dedication in such hosting institution will be counted as the Practicum activities and evaluated correspondingly. Thus, the hosting institution and tutor of your Thesis is the hosting institution and tutor of your Practicum. Regarding hosting institutions of your Practicum/Thesis, each student looks for their own interests.
- **Periods to enrol/stay. Enrollment in this course will be held simultaneously to the registration of the remaining credits for the Masters and the existence of an agreement is needed prior to the commencement of the stay.**
- **During the first semester.** This option is recommended for most of the students. One has to bear in mind that the schedule of practicum should be compatible with the classes in other modules. Since teaching activities are significantly reduced as of late November, you can program your Practicum along December and January.
  - **During the second semester.** This is not the recommended option taking into account the number of hours you need to dedicate to your Master Thesis during this semester.



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➤ **Stages of completion of your stay.**

1. Information talk from the JEMES master coordinator (Gara Villalba).
2. Students must send an e-mail to the Practicum coordinator (xavier.gabarrell@uab.cat ) expressing their interests, preferred period (first semester or second semester), field of interest, a short CV in Word or pdf format providing details about Spanish and Catalan skills. Such e-mail must be sent no later than November 5th.
3. If offers are available, the Practicum coordinator will publish in the Campus Virtual a list of places, including a brief description, to make your practicum. This will be between November 5th and November 20th.
4. During a period of one week after the previous point, students can express their preferences for making their stay. Each student will point to three choices in order of preference.
5. The Practicum coordinator will distribute practicum offers based on the preferences of students and conditions of the places (for example, transportation needs, language skills, selected by the company, etc.). Selection between two students applying for the same option will be based on students academic marks.
6. The Practicum coordinator will contact the tutor at the hosting institution to provide him/her with the name and CV of students assigned by the Practicum coordinator.
7. Through the data provided by the practicum coordinator, the student should contact the hosting institution responsible for maintaining an interview to set the details of your stay (hours, tasks to do, etc.). This interview is needed prior to the final acceptance of the student.
8. If the interview is satisfactory, the student must send via e-mail the Activity Proposal form to the The Practicum coordinator. This will contact the Academic Management of the Faculty of Sciences, who shall prepare the corresponding agreement between the UAB and the hosting institution. The agreement will be prepared with multiple copies.
9. The Academic Management of the Faculty of Sciences will send such copies of the agreement, duly signed by the rector of UAB, to the hosting institution responsible to be signed and returned by the hosting institution responsible to the Academic Management of the Faculty of Sciences.
10. Once the agreement is signed, students can start their practicum activities.
11. Finishing your stay. Evaluation according to the following paragraph.

➤ **Practicum Evaluation**

Evaluation will be performed according to the following marks:

- 50% by the person responsible for the student at the hosting institution (the person that will fill in the Activity proposal form).
- 50% by the university tutor (Xavier Gabarrell) according to the report presented and its considered opinion.

The way to proceed is as follows:

1. As soon as you finish your dedication to the Practicum you **MUST** write a 2-3 pages **Memorandum of Practicum activities** (see appendix) and send it by e-mail to the Practicum coordinator at xavier.gabarrell@uab.cat  
This report will count 50% of your qualification



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2. **Once received the report**, the Practicum coordinator will e-mail an **Evaluation form** (see appendix) to the person responsible for the student at the hosting institution. He/she **MUST** fill and sent it back to the Practicum coordinator (by e-mail or enclosed envelop). This will count another 50% of your qualification.
3. If steps 1 or 2 are not performed, I will assume you did not do the Practicum and you will fail to pass
4. If the rating is negative or steps 1 or 2 are not done, the student will fail to pass the Practicum.

➤ **Common variations to this procedure.**

If students want to find a hosting institution to do the practicum, the student must talk directly with the Practicum coordinator to decide if an agreement can be carried out mainly according the work plan and legal limitations. Prior to this talk, the student can use the documentation provided in the present document if requested by the hosting institution. The student must contact the practicum coordinator with enough time to process the agreement before the start of the practicum. This contact should be equal to or no greater than two-three weeks (which is the time generally needed to process an agreement). All other requirements of registration and evaluation of the subject are completely equivalent to the procedure explained in the already established and previously detailed herein.

## ATTACHED DOCUMENTATION

- **Activity Proposal form:** Document that must be completed by the company/research institution and by the student prior to the beginning of the practicum.
- **Agreement:** Official document signed between the UAB and the hosting institution to frame the practicum and to recognize the credits.
- **Evaluation form:** document that the tutor responsible of the student named by the company/research institution will use to value the work of students during their stay. This evaluation will correspond to a 50% of the module qualification.
- **Memorandum of Practicum activities:** Report written by the student that must be sent to the academic tutor right after the stay of the student has finished. This will count another 50% of the final qualification of the module.



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Facultat de Ciències

Gestió Acadèmica

## ACTIVITY PROPOSAL FORM

### To fill by the company/research institution:

Name and position of the person signing the agreement:

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Name of de the company/research institution:

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Company code (CIF):

E-mail:

---

Street, number:

---

Town:

Zip Code:

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Phone:

FAX:

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Name of the tutor responsible of the student named by the company/research institution:

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Period for Practicum: from day/month/year to day/month/year

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Working plan:

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X	Code	Module	Credits
	40469	JEMES Practicum	10

### To fill by the student

Name:

Last name:

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DNI/Passport:

Birth date:

Phone:

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E-mail:

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Academic Tutor: Dr Xavier Gabarrell (email: [xavier.gabarrell@uab.cat](mailto:xavier.gabarrell@uab.cat))

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Bellaterra, **day** of **month** of 200

### INSTRUCTIONS TO FILL THE FORM

This form must be completed by the student and by the tutor at the hosting institution. Then, the student has to e-mail the form to the academic tutor ([xavier.gabarrell@uab.cat](mailto:xavier.gabarrell@uab.cat)) who in turn will forward the form to the Administration staff of the Faculty of Sciences for ulterior formalization of the agreement.

#### **To fill by the company/research institution:**

Data necessary to write the agreement by the Administration staff of the Faculty of Sciences.

**Name and position of the person signing the agreement:** person of the company/research institution whose name will appear in the contract agreement.

**Name of the tutor responsible of the student named by the company/research institution:** person of the company/research institution responsible for setting the work, work follow-up and evaluation.

**Period for Practicum:** starting and finishing dates. This dates will appear in the agreement and correspond to the period of time in which the student has a medical insurance as Practicum student.

**Working plan:** Brief description (1-2 lines) with the tasks foreseen during the Practicum period

#### **To fill by the student**

Data necessary to write the agreement by the Administration staff of the Faculty of Sciences.

**Academic Tutor:** professor at the UAB that will make the monitoring and evaluation of the dedication of the student.



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## AGREEMENT FOR THE UNDERTAKING OF IN-COMPANY PRACTICUMS FOR OBTAINING ACADEMIC CREDITS

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Bellaterra (Cerdanyola del Vallès), 00 [day]/00 [month]/200\*

### PARTIES

For the first party, Dr XXXXXX, Vice-Chancellor of the *Universitat Autònoma de Barcelona*, with the corresponding legal authority established by article 75 of the UAB Statutes, in accordance with his designation as Vice-Chancellor through Decree 269/2005 of December 13 2005, of the *Generalitat de Catalunya*.

For the second party, Mr\* /Ms \*XXXX, in the name and representation of the company XXXX, with CIF Fiscal Number XXXX, and with the following company address: [Number/Street/Town/Postal Code] and telephone XXXX.

Each of the parties acknowledges that the other has sufficient legal capacity for this agreement, and to this end they make the following

### RECITAL

I. The advisability and relevance that students taking the UAB's Master in (XXX) should combine their academic training with professional practice is made clear by the syllabus for the said Master, approved by the Committee for Academic Affairs, by delegation of the Governing Council, 9/06/2006.

II. Article 9.3 of Spanish Royal Decree 56/2005, of January 21 2005, regulating official university postgraduate studies, and its subsequent modifications, allow universities to establish agreements of collaboration with other public or private institutions or organisations, as well as with companies and industry, for the development of training activities included within studies for a Master's degree.

III. The Framework for drawing-up the Masters' syllabi, approved by the Committee for Academic Affairs on March 21 2006, contemplates the possibility of including modules of a project-based or practical character.

To this end, the parties subscribe to this document on the basis of the following:

### CLAUSES

First.- The objective of this agreement is for UAB students of (name of studies) to undertake periods of placement with (company/organisation), for the development of practical study or of a project.



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Second.- The company/organisation undertakes to design a programme of practicums suitable to the objectives established by the syllabus that the student is following.

Third.- The (Faculty/School) shall nominate an academic tutor for each student participating in this agreement, the said tutor being responsible for monitoring and evaluating the practicums.

Fourth.- Within a maximum period of \* from the signing of this agreement, (company/organisation) shall notify (centre/school) the name of a tutor, designated by the company/organisation, responsible for programming and coordinating the practicums. On termination of the period of practicums, the said tutor shall provide a report accrediting the extent to which the student has taken advantage of the practicums, which report shall serve as the basis for the said student's academic assessment.

Fifth.- 1.- The value of the academic credits obtained by the student for practical study or project-based work pertaining to this current agreement shall be that established by the corresponding syllabus.

2.- For calculating the total number of hours that the student shall be required to undertake, the company/organisation must bear in mind that the minimum number of hours per academic credit is 25, and that the maximum number of hours is 30.

Sixth.- The undertaking of practicums does not imply any assumption, for either of the parties, of obligations beyond those strictly established in this document, and in no event shall the undertaking of practicums imply the existence of a work relationship between the student and the company/organisation.

Seventh.- 1. Students undertaking practicums shall be covered by Student Insurance in the terms indicated by current legislation for this subject.

2. Those students not covered by the application of the terms of the said Student Insurance must, at the time of applying for the practicums, accredit their insurance coverage within another insurance system.

Eighth.- Each academic year, the (Faculty/School) shall draw-up an updated annex that shall contain, at the least, the following data:

- a) A list of students participating in the practicums outlined by this agreement.
- b) The students' dates of birth.
- c) The name of the academic tutor.
- d) The name of the tutor nominated by the company/organisation.



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- e) The number of academic credits that are obtained through the practicums and the name of the module to which these said credits shall apply.
- f) A plan for the development of the agreement: type of training, start and conclusion dates, monitoring, form of assessment, etc.

Ninth.- 1. This agreement shall take effect from the moment of its signing, and its duration shall be XX (years).

2. The agreement can be rescinded for any of the following causes:

- a) By mutual accord of the parties, such accord given in writing.
- b) For a complaint made by either one of the parties, made with a minimum of three months' application.
- c) For general causes established by current legislation.

Tenth.- Any modification that alters the content of the present agreement must be expressed by mutual accord and by both parties, in an annexe document, for the said modification to be valid.

Therefore, in proof of their conformity with the content of this agreement, the parties sign this document in quadruplicate in the place and on the date indicated.

The Vice-Chancellor  
By authorisation,

The Company/Organisation

The Dean/Director of (Faculty/School)

### AGREEMENT APPENDIX

1. Participating student: XXXXXX
2. The academic tutor will be: XXXXX
3. The tutor appointed by **XXXX(company name)**: Mr/Ms. XXXX
4. The student will get XX credits for the following subject XXXX
5. The tasks carried out by the student will be XXXXXXXXXXXXX
6. The duration of the training will be from (starting date) XXX to (ending date) XXX
7. In order to assess the student, we will take into consideration not only the report provided by the appointed tutor but also the report made by the student.



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With the authorization of  
The vice-chancellor

(company name) XXXXX

Dr. Jordi Bartrolí  
Dean of the Faculty of Sciences

(authorised signature)

Bellaterra (Cerdanyola del Valles) , (date) XXXX

**EVALUATION FORM OF THE JEMES STUDENTS PRACTICUM BY  
THE HOSTING INSTITUTION/COMPANY**

Hosting Institution:	
Supervisor name & e-mail:	

Student name :	
ID type and number:	

1. Value the previous training of the student in order to the needs of the work that you have proposed to him/her within the framework of the project:

Very good	Good	Regular	Poor	Very poor
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

2. Value the following skills of the student:

	Very good	Good	Regular	Poor	Very poor
a) Capacity to organize the work	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b) Capacity to solve problems	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c) Capacity for social relationship	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d) Communication skills	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e) Capacity to carry out the assigned work	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
f) Capacity for work in groups	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
g) Initiative skills	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
h) Capacity to adapt to the surroundings	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
i) Interest in the work	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

3. Please, indicate which knowledge or which training would have been useful for the student according to the experience of the work that the student carried out



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4. Evaluate in a global way the work carried out by the student (*1 minimum – 10 maximum*)

Global mark:	
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5. Please, indicate any suggestions that you may consider interesting.

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Signature:

Date:

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Instructions: Please, sign this form, put it in a close envelop and send it to:

Professor Xavier Gabarrell

Department of Chemical Engineering  
Escola d'Enginyeria  
Universitat Autònoma de Barcelona  
08193 Cerdanyola del Vallès, Barcelona

Alternatively, you may give it to the student instead of sending it by regular mail.



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### **Memorandum of Practicum activities**

As soon as you finish your dedication to the Practicum you **MUST** write a 2-3 pages report of your activities. This report will count 50% of your qualification.

The written report to be submitted to [xavier.gabarrell@uab.cat](mailto:xavier.gabarrell@uab.cat) at the end of your stay must necessarily consist of the following parts, which are detailed below:

(a) Introduction: This part describes the hosting institution in which the student has made the stay, including all the following information: Objective (goals) of your practicum and brief description of the project were you enrolled

(b) work done by the student: This part must be, necessarily, the central body of the report and it should describe the main tasks that the student has done during its stay. This description should include essentially, a brief summary of tasks developed as Practicum activities, responsibilities given to you and any other comments you want to highlight. Confidentiality issues should be respected at all times. It is the responsibility of the student to find a way to reconcile the description of work with interest in the field of the JEMES Master and scrupulously respecting any confidentiality requirements at the same time.

(c) Autoevaluation: the student must explain what he has learned during the practicum, what weaknesses or strengths can be drawn from their experience.