



POLITÉCNICA

INTERNATIONAL  
CAMPUS OF  
EXCELLENCE

COORDINATION PROCESS OF  
LEARNING ACTIVITIES  
PR/CL/001



E.T.S. de Ingenieros  
Industriales

# ANX-PR/CL/001-01

## LEARNING GUIDE

### SUBJECT

**53001516 - Introduction To Complexity Economics**

### DEGREE PROGRAMME

05BD - Master Universitario en Ingeniería de la Organización

### ACADEMIC YEAR & SEMESTER

2020/21 - Semester 1

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## 1. Description

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### 1.1. Subject details

<b>Name of the subject</b>	53001516 - Introduction To Complexity Economics
<b>No of credits</b>	3 ECTS
<b>Type</b>	Optional
<b>Academic year of the programme</b>	Second year
<b>Semester of tuition</b>	Semester 3
<b>Tuition period</b>	September-January
<b>Tuition languages</b>	English
<b>Degree programme</b>	05BD - Master Universitario en Ingeniería de la Organización
<b>Centre</b>	05 - Escuela Técnica Superior de Ingenieros Industriales
<b>Academic year</b>	2020-21

## 2. Faculty

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### 2.1. Faculty members with subject teaching role

<b>Name and surname</b>	<b>Office/Room</b>	<b>Email</b>	<b>Tutoring hours *</b>
Rafael Ramos Diaz (Subject coordinator)	UD Economía	rafael.ramos@upm.es	Tu - 12:00 - 13:30

\* The tutoring schedule is indicative and subject to possible changes. Please check tutoring times with the faculty member in charge.

## 3. Prior knowledge recommended to take the subject

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### 3.1. Recommended (passed) subjects

- Tecnología, Organización Y Nuevos Modelos De Negocio Digital
- Complejidad Y Redes

### 3.2. Other recommended learning outcomes

- Economía

## 4. Skills and learning outcomes \*

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### 4.1. Skills to be learned

CB06 - Poseer y comprender conocimientos que aporten una base u oportunidad de ser originales en el desarrollo y/o aplicación de ideas, a menudo en un contexto de investigación

CB07 - Que los estudiantes sepan aplicar los conocimientos adquiridos y su capacidad de resolución de problemas en entornos nuevos o poco conocidos dentro de contextos más amplios (o multidisciplinares) relacionados con su área de estudio

CB10 - Que los estudiantes posean las habilidades de aprendizaje que les permitan continuar estudiando de un modo que habrá de ser en gran medida autodirigido o autónomo

CE04 - Conocer las ciencias de la complejidad y las redes y sus efectos en sectores, industrias y modelos de negocio

CG05 - Conocer las tendencias predominantes en el entorno actual de las distintas políticas funcionales (marketing, producción, logística, finanzas, recursos humanos, liderazgo...)

CG06 - Conocer y aplicar las principales tramas conceptuales (frameworks) para el desarrollo de la estrategia de una organización y la gestión de los procesos de diseño, de gestión de la información y cambio de dicha organización

CG07 - Modelar diferentes problemas de diseño de las organizaciones, conocer y seleccionar técnicas de Ingeniería de Organización apropiadas, así como obtener, comunicar, discutir y aplicar los resultados correspondientes

CT01 - Aplica. Habilidad para aplicar conocimientos científicos, matemáticos y tecnológicos en sistemas relacionados con la práctica de la ingeniería

CT05 - Resuelve. Habilidad para identificar, formular y resolver problemas de ingeniería

CT08 - Entiende los impactos. Educación amplia necesaria para entender el impacto de las soluciones ingenieriles en un contexto social global

CT09 - Se actualiza. Reconocimiento de la necesidad y la habilidad para comprometerse al aprendizaje continuo

CT10 - Conoce. Conocimiento de los temas contemporáneos

CT11 - Usa herramientas. Habilidad para usar las técnicas, destrezas y herramientas ingenieriles modernas necesarias para la práctica de la ingeniería

CT12 - Es bilingüe. Capacidad de trabajar en un entorno bilingüe (inglés/español)

## 4.2. Learning outcomes

RA52 - Interpretar y caracterizar los fenómenos económicos desde perspectivas distintas de la dominante en el modelo neoclásico y, en concreto, desde las ciencias de la complejidad y la evolución

\* The Learning Guides should reflect the Skills and Learning Outcomes in the same way as indicated in the Degree Verification Memory. For this reason, they have not been translated into English and appear in Spanish.

## 5. Brief description of the subject and syllabus

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### 5.1. Brief description of the subject

The Great Recession has been a challenge for conventional economics, and it has not stood well in the trial. Mainstream economics, what is taught in economics faculties and explained in textbooks, has not provided us with the means to anticipate, deal with and repair damages caused.

The proposal is to reconsider the foundations and give way to different perspectives and approaches that have been held as little more than singularities until now from the ranks of mainstream economics. Some of them are here long ago, but only now are gaining visibility and acceptance. Post-keynesian economics, behavioral economics, complexity economics, econophysics and evolutionary economics are some of the best regarded and promising proposals.

In this course we will examine the basics of complexity and evolutionary economics. With a duly warning: we do not have the answers yet, and there is a long journey ahead.

### 5.2. Syllabus

1. THE CONTEXT: RETHINKING CAPITALISM
2. WEALTH, DIVERSITY AND COMPLEXITY
3. TRADITIONAL ECONOMICS
4. A NEW FRAMEWORK: COMPLEXITY ECONOMICS
5. THE MECHANISM OF EVOLUTION AND THE CREATION OF WEALTH
6. EVOLVED SOLUTIONS TO HUMAN PROBLEMS
7. STRATEGY FROM AN EVOLUTIONARY PERSPECTIVE
8. BEHAVIORAL ECONOMICS
9. FINANCE: ADAPTIVE MARKETS
10. TAKERS AND MAKERS: WHO ARE THE REAL WEALTH CREATORS

## 6. Schedule

### 6.1. Subject schedule\*

Week	Face-to-face classroom activities	Face-to-face laboratory activities	Distant / On-line	Assessment activities
1			<b>1. THE CONTEXT: RETHINKING CAPITALISM</b> Duration: 02:00 Lecture	<b>Presentación en grupo y liderazgo del debate</b> Group presentation Continuous assessment Not Presential Duration: 00:30  <b>Participación en foros de debate</b> Individual work Continuous assessment Not Presential Duration: 00:30
2			<b>2. WEALTH, DIVERSITY AND COMPLEXITY</b> Duration: 02:00 Lecture	<b>Presentación en grupo y liderazgo del debate</b> Group presentation Continuous assessment Not Presential Duration: 00:30  <b>Participación en foros de debate</b> Individual work Continuous assessment Not Presential Duration: 00:30
3			<b>3. TRADITIONAL ECONOMICS</b> Duration: 02:00 Lecture	<b>Presentación en grupo y liderazgo del debate</b> Group presentation Continuous assessment Not Presential Duration: 00:30  <b>Participación en foros de debate</b> Individual work Continuous assessment Not Presential Duration: 00:30
4			<b>4. A NEW FRAMEWORK: COMPLEXITY ECONOMICS</b> Duration: 02:00 Lecture	<b>Presentación en grupo y liderazgo del debate</b> Group presentation Continuous assessment Not Presential Duration: 00:30  <b>Participación en foros de debate</b> Individual work Continuous assessment Not Presential Duration: 00:30

5			<p><b>5. THE MECHANISM OF EVOLUTION AND THE CREATION OF WEALTH</b> Duration: 012:00 Lecture</p>	<p><b>Presentación en grupo y liderazgo del debate</b> Group presentation Continuous assessment Not Presential Duration: 00:30</p> <p><b>Participación en foros de debate</b> Individual work Continuous assessment Not Presential Duration: 00:30</p>
6			<p><b>6. EVOLVED SOLUTIONS TO HUMAN PROBLEMS</b> Duration: 02:00 Lecture</p>	<p><b>Presentación en grupo y liderazgo del debate</b> Group presentation Continuous assessment Not Presential Duration: 00:30</p> <p><b>Participación en foros de debate</b> Individual work Continuous assessment Not Presential Duration: 00:30</p>
7			<p><b>7. STRATEGY FROM AN EVOLUTIONARY PERSPECTIVE</b> Duration: 02:00 Lecture</p>	<p><b>Presentación en grupo y liderazgo del debate</b> Group presentation Continuous assessment Not Presential Duration: 00:30</p> <p><b>Participación en foros de debate</b> Individual work Continuous assessment Not Presential Duration: 00:30</p>
8			<p><b>8. BEHAVIORAL ECONOMICS</b> Duration: 02:00 Lecture</p>	<p><b>Presentación en grupo y liderazgo del debate</b> Group presentation Continuous assessment Not Presential Duration: 00:30</p> <p><b>Participación en foros de debate</b> Individual work Continuous assessment Not Presential Duration: 00:30</p>
9			<p><b>9. FINANCE: ADAPTIVE MARKETS</b> Duration: 02:00 Lecture</p>	<p><b>Presentación en grupo y liderazgo del debate</b> Group presentation Continuous assessment Not Presential Duration: 00:30</p> <p><b>Participación en foros de debate</b> Individual work Continuous assessment Not Presential Duration: 00:30</p>



10			<b>10. MAKERS AND TAKERS: WHO ARE THE REAL WEALTH CREATORS</b> Duration: 02:00 Lecture	<b>Presentación en grupo y liderazgo del debate</b> Group presentation Continuous assessment Not Presential Duration: 00:30  <b>Participación en foros de debate</b> Individual work Continuous assessment Not Presential Duration: 00:30
11				
12				
13				
14				
15				
16				
17				<b>Examen final (convocatoria ordinaria)</b> Online test Final examination Not Presential Duration: 03:00

Depending on the programme study plan, total values will be calculated according to the ECTS credit unit as 26/27 hours of student face-to-face contact and independent study time.

\* The schedule is based on an a priori planning of the subject; it might be modified during the academic year, especially considering the COVID19 evolution.

## 7. Activities and assessment criteria

### 7.1. Assessment activities

#### 7.1.1. Continuous assessment

Week	Description	Modality	Type	Duration	Weight	Minimum grade	Evaluated skills
1	Presentación en grupo y liderazgo del debate	Group presentation	No Presential	00:30	5%	5 / 10	CG05 CG06 CB07 CT01 CT05 CT09 CT10 CB06 CB10 CG07 CT08 CT11 CT12 CE04
1	Participación en foros de debate	Individual work	No Presential	00:30	5%	5 / 10	CG05 CG06 CB07 CT01 CT05 CT09 CT10 CB06 CB10 CG07 CT08 CT11 CT12 CE04
2	Presentación en grupo y liderazgo del debate	Group presentation	No Presential	00:30	5%	5 / 10	CG05 CG06 CB07 CT01 CT05 CT09 CT10 CB06 CB10 CG07 CT08 CT11

							CT12 CE04
2	Participación en foros de debate	Individual work	No Presential	00:30	5%	5 / 10	CG05 CG06 CB07 CT01 CT05 CT09 CT10 CB06 CB10 CG07 CT08 CT11 CT12 CE04
3	Presentación en grupo y liderazgo del debate	Group presentation	No Presential	00:30	5%	5 / 10	CG05 CG06 CB07 CT01 CT05 CT09 CT10 CB06 CB10 CG07 CT08 CT11 CT12 CE04
3	Participación en foros de debate	Individual work	No Presential	00:30	5%	5 / 10	CG05 CG06 CB07 CT01 CT05 CT09 CT10 CB06 CB10 CG07 CT08 CT11 CT12 CE04
4	Presentación en grupo y liderazgo del debate	Group presentation	No Presential	00:30	5%	5 / 10	CG05 CG06 CB07 CT01 CT05 CT09 CT10 CB06 CB10 CG07

							CT08 CT11 CT12 CE04
4	Participación en foros de debate	Individual work	No Presential	00:30	5%	5 / 10	CG05 CG06 CB07 CT01 CT05 CT09 CT10 CB06 CB10 CG07 CT08 CT11 CT12 CE04
5	Presentación en grupo y liderazgo del debate	Group presentation	No Presential	00:30	5%	5 / 10	CG05 CG06 CB07 CT01 CT05 CT09 CT10 CB06 CB10 CG07 CT08 CT11 CT12 CE04
5	Participación en foros de debate	Individual work	No Presential	00:30	5%	5 / 10	CG05 CG06 CB07 CT01 CT05 CT09 CT10 CB06 CB10 CG07 CT08 CT11 CT12 CE04
6	Presentación en grupo y liderazgo del debate	Group presentation	No Presential	00:30	5%	5 / 10	CG05 CG06 CB07 CT01 CT05 CT09 CT10 CB06

							CB10 CG07 CT08 CT11 CT12 CE04
6	Participación en foros de debate	Individual work	No Presential	00:30	5%	5 / 10	CG05 CG06 CB07 CT01 CT05 CT09 CT10 CB06 CB10 CG07 CT08 CT11 CT12 CE04
7	Presentación en grupo y liderazgo del debate	Group presentation	No Presential	00:30	5%	5 / 10	CG05 CG06 CB07 CT01 CT05 CT09 CT10 CB06 CB10 CG07 CT08 CT11 CT12 CE04
7	Participación en foros de debate	Individual work	No Presential	00:30	5%	5 / 10	CG05 CG06 CB07 CT01 CT05 CT09 CT10 CB06 CB10 CG07 CT08 CT11 CT12 CE04

8	Presentación en grupo y liderazgo del debate	Group presentation	No Presential	00:30	5%	5 / 10	CG05 CG06 CB07 CT01 CT05 CT09 CT10 CB06 CB10 CG07 CT08 CT11 CT12 CE04
8	Participación en foros de debate	Individual work	No Presential	00:30	5%	5 / 10	CG05 CG06 CB07 CT01 CT05 CT09 CT10 CB06 CB10 CG07 CT08 CT11 CT12 CE04
9	Presentación en grupo y liderazgo del debate	Group presentation	No Presential	00:30	5%	5 / 10	CG05 CG06 CB07 CT01 CT05 CT09 CT10 CB06 CB10 CG07 CT08 CT11 CT12 CE04
9	Participación en foros de debate	Individual work	No Presential	00:30	5%	5 / 10	CG05 CG06 CB07 CT01 CT05 CT09 CT10 CB06 CB10 CG07 CT08 CT11

							CT12 CE04
10	Presentación en grupo y liderazgo del debate	Group presentation	No Presential	00:30	5%	5 / 10	CG05 CG06 CB07 CT01 CT05 CT09 CT10 CB06 CB10 CG07 CT08 CT11 CT12 CE04
10	Participación en foros de debate	Individual work	No Presential	00:30	5%	5 / 10	CG05 CG06 CB07 CT01 CT05 CT09 CT10 CB06 CB10 CG07 CT08 CT11 CT12 CE04

### 7.1.2. Final examination

Week	Description	Modality	Type	Duration	Weight	Minimum grade	Evaluated skills
17	Examen final (convocatoria ordinaria)	Online test	No Presential	03:00	100%	5 / 10	CG05 CG06 CB07 CT01 CT05 CT09 CT10 CB06 CB10 CG07 CT08 CT11 CT12 CE04

### 7.1.3. Referred (re-sit) examination

No se ha definido la evaluación extraordinaria.

### 7.2. Assessment criteria

La evaluación continua se articula del siguiente modo:

- Presentaciones en equipo de los temas de la asignatura: 50%
- Participación individual en los debates en foros: 50%

La prueba de evaluación final será un examen escrito no presencial

## 8. Teaching resources

### 8.1. Teaching resources for the subject

Name	Type	Notes
MOODLE	Web resource	Temas, casos, lecturas complementarias, foros de debate, cuestionarios de autoevaluación
Eric D Beinhocker, The Origin of Wealth: The Radical remaking of Economics and What it Means for Business and Society, Harvard Business Review Press, 2007	Bibliography	
César Hidalgo, Why Information Grows: The evolution of Order, from Atoms to Economies, Basic Books, 2015	Bibliography	
Institute for New Economic Thinking	Web resource	<a href="https://www.ineteconomics.org">https://www.ineteconomics.org</a>
Ergodicity Economics	Web resource	<a href="https://ergodicityeconomics.com">https://ergodicityeconomics.com</a>



London Mathematical Laboratory	Web resource	<a href="http://lml.org.uk/research/economics/">http://lml.org.uk/research/economics/</a>
Economics	Web resource	<a href="https://economics.com">https://economics.com</a>
Mariana Mazzucato	Web resource	<a href="https://marianamazucato.com/blog/creating-a-more-symbiotic-medical-innovation-eco-system/">https://marianamazucato.com/blog/creating-a-more-symbiotic-medical-innovation-eco-system/</a>
The Growth Lab - Harvard	Web resource	<a href="https://growthlab.cid.harvard.edu">https://growthlab.cid.harvard.edu</a>
Atlas of Economic Complexity	Web resource	<a href="https://atlas.cid.harvard.edu/rankings">https://atlas.cid.harvard.edu/rankings</a>
Economics for Inclusive Prosperity	Web resource	<a href="https://econfip.org">https://econfip.org</a>
The yak Collective	Web resource	<a href="https://www.yakcollective.org">https://www.yakcollective.org</a>

## 9. Other information

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### 9.1. Other information about the subject

La asignatura se relaciona con el ODS8, el ODS9, el ODS10, el ODS11 y el ODS12