

Course guide 220136 - IC - Innovation and Creativity: Tools for Engineering

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Unit in charge:	Terrassa School of Industrial, Aerospace and Audiovisual Engineering
Teaching unit:	758 - EPC - Department of Project and Construction Engineering.
Degree:	BACHELOR'S DEGREE IN AEROSPACE TECHNOLOGY ENGINEERING (Syllabus 2010). (Optional subject). BACHELOR'S DEGREE IN AEROSPACE VEHICLE ENGINEERING (Syllabus 2010). (Optional subject). BACHELOR'S DEGREE IN INDUSTRIAL TECHNOLOGY ENGINEERING (Syllabus 2010). (Optional subject).

Academic year: 2024 ECTS Credits: 3.0 Languages: English

LECTURER

Coordinating lecturer: Miguel Angel Saiz Segarra

Others:

TEACHING METHODOLOGY

The methodology will be: Theoretical exposition and working in groups some exercises for practicing and improving the students creativity.

LEARNING OBJECTIVES OF THE SUBJECT

STUDY LOAD

Туре	Hours	Percentage
Self study	45,0	60.00
Hours large group	30,0	40.00

Total learning time: 75 h

CONTENTS

Module 1: Introduction to creativity. Is there Creativity in engineering?

Description:

In this module we try answer the next questions: It is engineering creative? Has sense the creativity in engineering? It is useful waste time thinking in improving my creativity? Have creative people similar traits? Am I a creative person? I will never be creative. What are the main factors that influence in creativity? What are the obstacles to creative thinking and how to overcome them? Can I improve my creative traits? Where do ideas come from?

Related activities:

Theoretical explanations. Self-reflections about the theoretical explanations working in groups. Examples and exercises.

Full-or-part-time: 12h Theory classes: 5h Self study : 7h



Module 2: Diving into Creativity.

Description:

In this module we discuss about some topics as: Do we really have two sides in my brain? Are they really different? Left side: reasoning. Right side: imagination. Engineering needs them both. Do I really want to use them? Advantages & Disadvantages of creativity. Creativity is a process, not just to have a good idea. Success, failure and the drive to keep creating. Creativity needs ideas and actions. How to support the failure. The four roles of creativity: Explorer, artist, judge, warrior. Where am I? Inside the life of some scientists and inventors.

Related activities:

Theoretical explanations. Self-reflections about the theoretical explanations working in groups. Examples and exercises.

Full-or-part-time: 13h Theory classes: 5h Self study : 8h

Module 3: Let?s play with the creativity. Applied Creativity.

Description:

In this module we are going to apply the creativity, basically using some of the most known creativity techniques and learning to create new ones. WE discuss also about these topics: How improve the creativity in engineering. How obtain ideas from people. Different techniques of creativity. Theory and applications. Six thinking hats. Brainstorming. Sleep writing. TRIZ. Only genius can innovate? How can we help to anyone in having ideas? How to perform a technique of creativity in group. Different examples.

Related activities:

Theoretical explanations. Self-reflections about the theoretical explanations working in groups. Examples and exercises.

Full-or-part-time: 12h Theory classes: 5h Self study : 7h

Module 4: Engineering the creativity: Applied Personal Creativity

Description:

In this module we are going to work in the next topics: How apply the creativity in the engineering problems. Theory of invention. Theory of Inventive Problem Solving. TRIZ in more detail. How use TRIZ in invention processes. Methods for inventing and innovating. How combine Convergent and divergent thinking. Innovators versus adaptors: main traits.

Related activities:

Theoretical explanations. Self-reflections about the theoretical explanations working in groups. Examples and exercises.

Full-or-part-time: 13h Theory classes: 5h Self study : 8h



Module 5: Innovation: Applied Collective Creativity.

Description:

In this module we integrate the creativity in the enterprise. The next topics are going to be worked: How enterprises innovate? How obtain ideas and transform in innovation. Innovation is not invention. The ten faces of innovation. The innovation groups. Incremental, Differential, Radical, and Breakthrough Innovation Projects.

Related activities:

Theoretical explanations. Self-reflections about the theoretical explanations working in groups. Examples and exercises.

Full-or-part-time: 12h

Theory classes: 5h Self study : 7h

Module 6: Creativity, innovation and enterprises

Description:

In this module we continue diving in the applied innovation inside enterprises. The topics will be the next ones: How managing and transform individual creativity inside enterprises for obtaining innovation as a product of collective creativity. Innovation groups in the enterprises. Examples of applications.

Related activities:

Theoretical explanations. Self-reflections about the theoretical explanations working in groups. Examples and exercises.

Full-or-part-time: 13h Theory classes: 5h Self study : 8h

GRADING SYSTEM

The assessment will be a combination between the works inside the class and the homework activities.

BIBLIOGRAPHY

Basic:

- Altshuller, G.; Shulyak, L.; Fedoseev, U. 40 principles TRIZ keys to technical innovation. Worcester, MA: Technical Innovation Center, 1998. ISBN 0964074036.

- Savransky, Semyon D. Engineering of creativity: introduction to TRIZ methodology of inventive problem solving. Boca Raton, Fla. [etc.]: CRC Press, cop. 2000. ISBN 0849322553.

- Kelley, Tom. The ten faces of innovation: IDEO's strategies for beating the devil's advocate & driving creativity throughout your organization. New York: Currency/Doubleday, 2005. ISBN 9780385512077.

- Altshuller G. S.; Shapiro R. V. "About a technology of creativity". Questions of psychology. 1956, núm. 6, p. 37-49.

Complementary:

- Csikszentmihalyi, Mihaly. Flow: the psychology of optimal experience. New York: Harper Perennial, 2008. ISBN 9780061339202.

RESOURCES

Other resources:

- Saiz, M. A.(2011) Curso de creatividad aplicado a la empresa, presentada y publicada en el XV Congreso de Ingenieria de Proyectos. Huesca, 6, 7 y 8 de julio 2011.

- Saiz M. A. (2006) La importancia del grupo de innovación, presentada y publicada en el X CONGRESO DE INGENIERIA DE PROYECTOS.Valencia. 13, 14 y 15 de septiembre de 2006.

- Saiz M. A. (2006) La generación de ideas en entornos profesionales de alto nivel tecnológico: Una aplicación en SEAT ? Centro



Técnico. X CONGRESO DE INGENIERIA DE PROYECTOS. Valencia. 13, 14 y 15 de septiembre de 2006.

Saiz, M. A. (2005), Como potenciar la generación de ideas en la fase creativa de los procesos de innovación tecnológica en aplicaciones de la ingeniería industrial, Tesis Doctoral, UPC, Barcelona. <u>http://www.tdx.cesca.es/TDX-0629105-133644/index_an</u>
Saiz M. A. (2004) Técnica de innovación tecnológica aplicada al diseño de un componente en la industria del automóvil, VIII CONGRESO DE INGENIERIA DE PROYECTOS. Bilbao. 6, 7 y 8 de Octubre de 2004