

## Course guide

### 230552 - BUSINE - Business and Patents in Photonics

Last modified: 14/12/2023

**Unit in charge:** Barcelona School of Telecommunications Engineering  
**Teaching unit:** 731 - OO - Department of Optics and Optometry.  
**Degree:** MASTER'S DEGREE IN PHOTONICS (Syllabus 2013). (Compulsory subject).  
**Academic year:** 2023    **ECTS Credits:** 5.0    **Languages:** English

#### LECTURER

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**Coordinating lecturer:** Consultar aquí / See here:  
<https://telecos.upc.edu/ca/estudis/curs-actual/professorat-responsables-coordinadors/responsables-assignatura>

**Others:** Consultar aquí / See here:  
<https://telecos.upc.edu/ca/estudis/curs-actual/professorat-responsables-coordinadors/professorat-assignat-idioma>

#### DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

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##### Specific:

CE7. Ability to understand optical engineering as an economic and business activity considering, among others, social, ethical and sustainability aspects  
CE8. Understand the importance of patents as the basis of a technological company and having the ability to understand and write a patent in the field of photonics.

##### Generical:

CG1. Ability to project, design and implement products, processes, services and facilities in some areas of photonics, such as photonic engineering, nanophotonics, quantum optics, telecommunications and biophotonics.  
CG3. Ability for technical direction and direction of research, development and innovation projects, in research centers, companies and technology centers, in the field of Photonics.

##### Transversal:

1. EFFECTIVE USE OF INFORMATION RESOURCES: Managing the acquisition, structuring, analysis and display of data and information in the chosen area of specialisation and critically assessing the results obtained.
3. ENTREPRENEURSHIP AND INNOVATION: Being aware of and understanding how companies are organised and the principles that govern their activity, and being able to understand employment regulations and the relationships between planning, industrial and commercial strategies, quality and profit.
2. FOREIGN LANGUAGE: Achieving a level of spoken and written proficiency in a foreign language, preferably English, that meets the needs of the profession and the labour market.
4. TEAMWORK: Being able to work in an interdisciplinary team, whether as a member or as a leader, with the aim of contributing to projects pragmatically and responsibly and making commitments in view of the resources that are available.

##### Basic:

CB8. Students should be able to integrate knowledge and face the complexity of formulating judgments based on information that, being incomplete or limited, includes reflections on the social and ethical responsibilities linked to the application of their knowledge and judgment.  
CB9. Students should know how to communicate their conclusions and the knowledge and ultimate reasons that support them to specialized and non-specialized audiences in a clear and unambiguous way.

## TEACHING METHODOLOGY

- Lectures
- Activities

## LEARNING OBJECTIVES OF THE SUBJECT

The purpose of this course is to provide the students with the fundamental entrepreneurial and management skills required to successfully start and develop a technology based business. Special attention is paid to train engineers and scientists who are interested on the practical use of photonics technology in the development of photonic inventions and innovations, including their intellectual property right protection through patents.

The second purpose is to incite business awareness and to explore how scientific and technical concepts might be translated into real-life industrial applications.

Program will include lectures given by entrepreneurs that have the experience of starting-up a spin-off company. Participants will be also exposed to a highly interactive process of analysis and discussion, including case studies and small-group learning activities, such as the analysis of a business opportunity. Fundamental concepts on the effective writing and use of patents in business will be also discussed through several examples of photonic patents and company cases that have effectively used patents to leverage a successful technology based business.

### BIBLIOGRAPHY:

- Richard C. Dorf and Thomas H. Byers (2008), "Technology Ventures. From Idea to Enterprise", McGraw Hill Higher Education, ISBN 9780073350431
  - Randy Komisar (2001), "The Monk and the Riddle", Harvard Business School Press, ISBN 1578511402
  - Melissa A. Schilling (2008)
  - Strategic Management of Technological Innovation, McGraw Hill Higher Education, ISBN 9780073210582
  - Harnessing Light. Optical Science and Engineering for the 21st Century
  - National Academy Press (1998), ISBN 0309059917
  - MONA, Merging Optics and Nanotechnologies (2008). UE Report
  - Guy Kawasaki (2004), "The Art of the Start", Penguin Group (USA)
  - Guy Kawasaki (2011), "Enchantment", Penguin Group (USA)
  - B. DeMatteis, A. Gibbs, M. Neustel, "The Patent Writer", SquareOne Publishers, New York, 2006
  - J.T.Verdeyen, "Laser Electronics", Prentice Hall, 3rd Edition, 1994.
  - USPTO, "Manual of Patent Examining Procedure (MPEP)", <http://www.uspto.gov/web/offices/pac/mpep/>
  - EPO, "Guidelines for Examination in the European Patent Office", <http://www.epo.org/patents/law/legal-texts/guidelines>
  - Examples of photonics patents at Google Patents, <http://www.google.com/patents>
  - Examples of photonics patents at Esp@cenet, <http://ep.espacenet.com/>
- Updated topical specific bibliography and teaching materials will be distributed through the ATENEA web platform.

## STUDY LOAD

Type	Hours	Percentage
Hours large group	40,0	32.00
Self study	85,0	68.00

**Total learning time:** 125 h

## CONTENTS

### 1. Business in Photonics

**Description:**

- 1.1 Entrepreneurship
- 1.2 Identify business ideas and opportunities.
- 1.3 Elements of a business plan.
- 1.4 The minimum viable product.
- 1.5 Marketing high-tech products: the "chasm"
- 1.6 Basic concepts of financing a Start-up.
- 1.7 From prototype to product
- 1.8 Clusters and networking in Photonics.

**Specific objectives:**

Introduce the student to the concepts of entrepreneurship and business

Provide tools to evaluate business ideas

Introduce the professional itinerary of start-ups as an option, with advantages and disadvantages,

Introduce the main business concepts related to accounting, financing, and product development in a high-tech company.

**Full-or-part-time:** 18h 45m

Theory classes: 18h 45m

### 2. Patents in Photonics

**Description:**

- 2.1. Innovation and Entrepreneurship. An Intellectual Property based Economy.
- 2.2. Introduction to Patents in Technology and Business. Patent Information Management. Examples of Patents in Photonics.
- 2.3. Introduction to Patent Engineering: Structure and Scope of Protection of a Patent. Design of Claims and Specification. The US and the EPO patent systems.
- 2.4. Strategy in the Patent and Technology Business Ecosystem.

**Full-or-part-time:** 18h 45m

Theory classes: 18h 45m

## ACTIVITIES

### Market Place

**Description:**

By half of the course a marketplace session will be organized. In this session the participants will submit ideas that could become potential business opportunities. During this session participants will team up to form working groups

**Full-or-part-time:** 1h

Theory classes: 1h



### Presentation of a Photonics-related business

**Description:**

At the end of the course, during the week of special activities, the working groups will make a presentation of the photonics-related business that they have analyzed along the course in a simulated environment in which Venture Capitalists are seeking for good investing opportunities.

**Full-or-part-time:** 2h 48m

Theory classes: 2h 48m

## GRADING SYSTEM

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-As an Individual:

Weekly Assignments, participation in lectures, workshops and case studies (15%)

Short final Exam (15%)

-As a Team:

Course Project: Opportunity Analysis in Photonics (35%)

Course Project: Patent Writing in Photonics (35%)

## BIBLIOGRAPHY

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**Basic:**

- Komisar, R. The monk and the riddle. Harvard Business School Press, 2001. ISBN 1578516447.
- Melissa A.S. Strategic Management of Technological Innovation. McGraw Hill Higher Education, 2008. ISBN 9780073210582.
- Committee on Optical Science and Engineering ...[et al.]. Harnessing Light. Optical Science and Engineering for the 21st Century. Washington: National Academy Press, 1998. ISBN 0309059917.
- DeMatteis, B.; Gibbs, A.; Neustel, M. The Patent writer : how to write successful patent applications. Garden City Park, NY: SquareOne Publishers, 2006. ISBN 0757001769.
- Byers, T.H.; Dorf, R.C.; Nelson, A.J. Technology ventures. From idea to enterprise. 4th ed. McGraw Hill Higher Education, 2014. ISBN 1259252752.
- Kawasaki, G. Enchantment : the art of changing hearts, minds and actions. London: Portfolio Penguin, 2012. ISBN 1591843790.
- Verdeyen, J.T. Laser electronics. 3. Englewood Cliffs, NJ: Prentice Hall, 1995. ISBN 0131016687.
- Kawasaki, G. The Art of the start 2.0. New York: Portfolio/Penguin, 2015. ISBN 0241187265.

## RESOURCES

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**Hyperlink:**

- <http://www.google.com/patents>. Examples of photonics patents at Google Patents
- <http://www.uspto.gov/web/offices/pac/mpep/>. Manual of Patent Examining Procedure (MPEP)
- <http://ep.espacenet.com/>. -Examples of photonics patents at Esp@cenet
- <http://www.epo.org/patents/law/legal-texts/guidelines>. Guidelines for Examination in the European Patent Office