

## **GEST-D-307: The Theory of Innovation and Entrepreneurship**

### **Objective**

The purpose of this course is to provide a good understanding of the innovation process: from the factors stimulating innovative efforts by firms, to the impact of research activities on economic growth and welfare. The course method is based on lectures and a group work. The lectures include case studies, theoretical models, qualitative analyses and quantitative approaches.

### **Grade**

The evaluation process is composed of a final exam in English (including open questions, knowledge questions, and multiple choices) accounting for 70% of final mark and a group work accounting for 30%.

### **Group work**

By group of 5, you will analyze – creatively – several high value patents. The idea is the following: all the patents that will be assigned to each group are supposedly of a particularly high value according to the indicators proposed in the economic literature. Your objective will be to validate or invalidate this presumption by analysing the importance or success of the invention underlying the patent. Different aspects of the innovation can be explored (depending on your preferences and the accessibility of the information).

### **Grade carry-over**

Grade is carry-over to the second session according to the rules set by the ULB-SBS. The group work grade is not carried over to the second session. That is, the second session grade will only be made of the new exam grade.

### **Organization of the sessions**

Each course is composed of two 50 minutes lectures. These lectures are based on at least one reference article (and maximum two). Presence to the course is strongly advised. Main articles for each session are a highly recommended reading. Additional articles or references are listed and are worth reading. Copy of the slides and articles are available on mySBS (make sure you get a login and password if you haven't done so yet). The lectures will take place on Wednesdays from 2pm to 4pm in local UA2.118.

### **Main reference**

The main reference for the course will be the following book: Guellec, D. and B. van Pottelsberghe (2007), *The Economics of the European Patent System*, Oxford University Press.

### **Professor**

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## *Scheduling of Sessions*

<b>Session 1:</b>	<b>Innovation and society</b>	<b>06/02</b>	<b>UA2.118</b>
S.1.1.	From invention to market: Learning from case studies (40')		
S.1.2.	Course objectives, structure and grading scheme (15')		
S.1.3.	Social 'resistance' to change and institutions (40')		
<b>Session 2:</b>	<b>Knowledge creation and growth</b>	<b>13/02</b>	<b>UA2.118</b>
S.2.1.	The role of S&T (and other) policies (30')		
S.2.2.	R&D and growth, a quantitative analysis (1h20)		
<b>Session 3:</b>	<b>Intellectual property policies</b>	<b>20/02</b>	<b>UA2.118</b>
S.3.1.	Introduction Intellectual property rights (50')		
S.3.2.	Historical insight on patent systems (30')		
S.3.3.	Economic justification of patent systems (20')		
<b>Session 4:</b>	<b>Design of Patent systems - A</b>	<b>27/02</b>	<b>UA2.118</b>
S.4.1.	Subject matter, inventive step, scope, duration (50')		
S.4.2.	The cost factor and the role of fees (50')		
<b>Session 5:</b>	<b>Patent value + GW (speaker: Nicolas van Zeebroeck)</b>	<b>05/03</b>	<b>UA2.118</b>
S.5.1.	Puzzle of value indicators (50')		
S.5.2.	Group work : information session (50')		
<b>Session 6:</b>	<b>Design of patent systems - B</b>	<b>12/03</b>	<b>UA2.118</b>
S.6.1.	The Bayh-Dole Act and academic patenting (30')		
S.6.2.	Use of patents and filing strategies (30')		
S.6.3.	The importance of quality (40')		
<b>Session 7</b>	<b>Drivers of business R&amp;D</b>	<b>19/03</b>	<b>UA2.118</b>
S.7.1.	Determinants of business R&D, a quantitative analysis (60')		
S.7.2.	The R&D component of the Lisbon agenda (40')		
<b>Session 8</b>	<b>Qualitative insights into S&amp;T policies</b>	<b>09/04</b>	<b>UA2.118</b>
S.8.1.	Case study: Fiscal incentives for R&D in Belgium (60')		
S.8.2.	Entrepreneurship: Legal and regulatory environment (50')		
<b>Session 9</b>	<b>Technology cycles and appropriability</b>	<b>16/04</b>	<b>UA2.118</b>
S.9.1.	The S-curve and disruptive technologies (50')		
S.9.2.	Appropriability and strategy (50')		
<b>Session 10</b>	<b>The globalization of technology</b>	<b>23/04</b>	<b>UA2.118</b>
S.10.1.	Patent-based measure & quantitative analysis (50')		
S.10.2.	Survey-based measure of drivers (20')		
S.10.3.	Managerial implications (20')		

<b>Session 11</b>	<b>Financing innovation</b>	<b>30/04</b>	<b>UA2.118</b>
S.11.1.	Financing technology-based start-ups (50')		
S.11.2.	The determinants of venture capital (50')		
<b>Session 12</b>	<b>Innovation strategy</b>	<b>07/05</b>	<b>UA2.118</b>
S.12.1.	Innovation competencies (50')		
S.12.2.	Strategic innovation and patenting performances (50')		
	<b>Group work presentations (part 1)</b>	<b>26/04</b>	<b>AW1.115</b>
	<b>Group work presentations (part 2)</b>	<b>03/05</b>	<b>AW1.115</b>
	<b>Group work presentations (part 3)</b>	<b>10/05</b>	<b>AW1.115</b>

## Group work

### Requirements

- All students must be in a group of 5.
- The expected output of the group work is made of:
  - An oral presentation of **10 minutes** maximum **in English with 10 slides** (except appendices and references)
  - The slideshow presentation itself, which has to be sent electronically before the presentation (the deadline will be communicated later on)
- The group work will be handed in both electronically and on paper.
- Your Power Point presentation must include in appendix the main references associated with the subject of the group work. These references may include:
  - important websites;
  - book references;
  - references to the scientific literature;
  - references of interviews if relevant.
- It is important to keep in mind that the presentation may be performed by 1 or 2 students only. It is up to the group to adopt the most effective presentation strategy.

### Evaluation

The group work evaluation, accounting for 6 points out of 20, will take into account the quality of your research, PowerPoint report, and oral presentation.

### Topic

Each group will analyze – creatively – several high value patents belonging to one or more European firms. The idea is the following: all the patents that will be assigned to each group are supposedly of a particularly high value according to the indicators proposed in the economic literature. Your objective will be to validate or invalidate this presumption by analysing quantitatively and qualitatively the success of the invention underlying each patent. Your task will therefore consist of obtaining as much information on the patent and its underlying invention as possible to provide a financial appraisal of its economic value. You are however free to choose between the quantity of patents that you will analyse from the list provided to you and the thoroughness of your qualitative analysis. In terms of qualitative analysis, different aspects of the innovation can be explored (depending on your preferences and the accessibility of the data):

- Organisation of the research activities that lead to the invention and track record (or profile) of the inventors.
- Track record of the patent: Has it been granted? Opposed? In which countries has it been validated? For how long has it been enforced? Was it litigated? Sold to a third party? Exploitation of the patent by its holder: self-commercialization of the product or process, licensing of the patent against royalties, cross-licensing, etc.
- Technology spillovers: which preceding patents are cited by this one? Who owns them? Which patents are citing this one? What type of institutions owns them? What does it say about the competitive environment of your given patent? Can you suspect a picket fence, patent pool, or patent thicket around your patents?
- Market success: how was the invention brought to the market? Within different products or processes? Did it give rise to new trademarks? Who are the competitors (in terms of companies and technologies)?

## *Session 1: Innovation and Society*

### Session 1.1.

- From invention to market: Learning from case studies
- Course objectives, structure and grading scheme

### Session 1.2.

- Social 'resistance' to change and institutions

### Further readings

- J. Mokyr (2000), "Innovation and its enemies: The economic and political roots of technological inertia", in Olson M. and S. Kähkönen, A not-so-dismal science, Oxford University Press, Oxford, p. 61-91.
- P.F. Drucker (1998), "The Discipline of Innovation", Harvard Business Review, 76(6), pp.149-157.

## *Session 2: Knowledge creation and growth*

### Session 2.1.

- The role of S&T (and other) policies

### Session 2.2.

- The impact of R&D on Growth – A quantitative analysis

### Reference article

- Guellec D. and van Pottelsberghe B. (2003), "From R&D to Productivity Growth: Do The Source of Funds and Institutional Settings Matter?", Oxford Bulletin of Economics and Statistics, 66(3), 2004, pp. 353-376.  
[http://www.ulb.ac.be/cours/solvay/vanpottelsberghe/resources/oxf\\_pap\\_proof\\_obes105.pdf](http://www.ulb.ac.be/cours/solvay/vanpottelsberghe/resources/oxf_pap_proof_obes105.pdf)

### Further readings

- Lee N. Davis (2001), "R&D Investments, Information and Strategy", Technology Analysis & Strategic Management, 13(3), pp. 325-342.  
<http://ep.lib.cbs.dk/download/ISBN/x64602090x.pdf>

## *Session 3: Intellectual property policies*

### Session 3.1.

- Introduction Intellectual property rights

### Session 3.2.

- Historical insight on patent systems

### Session 3.3.

- Economic justification of patent systems

### Reference book

- Guellec, D. and B. van Pottelsberghe (2007), The Economics of the European Patent System, Oxford University Press, Chapter 1, Chapter 2, Chapter 3, chapter 7 (7.4).

### Further reading

- Scherer F. M. (2001), "The Economics of Human Genome Patents", Harvard and Princeton Universities, Association of American Medical College, 40p.  
<http://www.aamc.org/research/sloan/scherer.pdf>

## *Session 4: Design of patent systems - A*

### Session 4.1.

- Subject matter, inventive step, scope, duration

### Session 4.2.

- The cost factor and the role of fees

### Reference book and article

- Guellec, D. and B. van Pottelsberghe (2007), The Economics of the European Patent System, Oxford University Press, Chapter 5 and Chapter 7.
- François D. and van Pottelsberghe B. (2006), "The cost factor in patent systems", Working Paper.  
[http://www.solvay.edu/EN/Research/Bernheim/documents/thecostfactor\\_patentsystems\\_BVP\\_WP06-002bis.pdf](http://www.solvay.edu/EN/Research/Bernheim/documents/thecostfactor_patentsystems_BVP_WP06-002bis.pdf)
- de Rassenfosse G. and B. van Pottelsberghe, 2007. "Per un Pugno di Dollari: A First Look at the Price Elasticity of Patents," Oxford Review of Economic Policy, 23(4), 588-604.  
<http://ideas.repec.org/p/sol/wpaper/07-022.html>

## *Session 5: Patent value and groupwork*

### Session 5.1.

- The puzzle of patent value indicators

### Session 5.2.

- Information session on the groupwork

### Reference book and article

- Guellec, D. and B. van Pottelsberghe (2007), The Economics of the European Patent System, Oxford University Press, Chapter 4 (jointly with N. Van Zeebroeck).
- van Zeebroeck, N. (2007), The puzzle of patent value indicators, CEB Working Paper, <http://ideas.repec.org/p/sol/wpaper/07-023.html>

### Further readings

- Harhoff D., Scherer F. M. and Vopel K. (1999), "Citations, Family Size, Opposition and the Value of Patent Rights", 31p. <http://emlab.berkeley.edu/users/bhhall/harhoffetal99.pdf>
- Edwards D. (2002), "Patent Backed Securitization: Blueprint for a new asset class", Gerling NCM, 2001. Washington | CORE. [http://www.securitization.net/pdf/gerling\\_new\\_0302.pdf](http://www.securitization.net/pdf/gerling_new_0302.pdf)
- Hillery, J. (2004), "Securitization of Intellectual Property: Recent Trends from the United States", Washington CORE Working Paper, March 2004, <http://www.iip.or.jp/summary/pdf/WCORE2004s.pdf>

## *Session 6: Design of patent systems - B*

### Session 6.1.

- The Bayh-Dole Act and academic patenting

### Session 6.2.

- Use of patents and filing strategies

### Session 6.3.

- The importance of quality

### Reference book and articles

- Guellec, D. and B. van Pottelsberghe (2007), The Economics of the European Patent System, Oxford University Press, Chapter 6, Chapter 7 and Chapter 8.
- van Pottelsberghe, B. and N. van Zeebroeck (2008), A brief history of space and time: the scope year index as a patent value indicator based on families and renewals, Scientometrics, Vol. 75(2), available at <http://ideas.repec.org/p/cpr/ceprdp/6321.html>.

### Further readings

- van Zeebroeck, N. and B. van Pottelsberghe(2007), Filing strategies and patent value, CEB Working Paper, forthcoming.
- Sapsalis E. and B. van Pottelsberghe, 2007. "The Institutional Sources Of Knowledge And The Value Of Academic Patents," Economics of Innovation and New Technology, 16(2), 139-157.
- Mowery D. C. and Ziedonis A. A. (2002), "Academic patent quality and quantity before and after the Bayh-Dole act in the United States", Research Policy, 31(3), pages 399-418.  
[http://www.sciencedirect.com/science?\\_ob=MIimg&\\_imagekey=B6V77-45F666P-5-5&\\_cdi=5835&\\_user=532047&\\_orig=browse&\\_coverDate=03%2F31%2F2002&\\_sk=999689996&\\_view=c&\\_wchp=dGLbVlb-zSkWz&\\_md5=0878f3ea2cf44445500550c2fd29456b&\\_ie=/sdarticle.pdf](http://www.sciencedirect.com/science?_ob=MIimg&_imagekey=B6V77-45F666P-5-5&_cdi=5835&_user=532047&_orig=browse&_coverDate=03%2F31%2F2002&_sk=999689996&_view=c&_wchp=dGLbVlb-zSkWz&_md5=0878f3ea2cf44445500550c2fd29456b&_ie=/sdarticle.pdf)

## *Session 7: The drivers of business R&D*

### Session 7.1.

- Determinants of business R&D, a quantitative analysis

### Session 7.2.

- The R&D component of the Lisbon agenda

### Reference article

- Guellec D. and van Pottelsberghe B. (2003), “The Impact of Public R&D Expenditure on Business R&D”, *Economics of Innovation and New Technologies*, 12(3), pp.225-244.  
[http://www.ulb.ac.be/cours/solvay/vanpottelsberghe/resources/Pap\\_EINT\\_2.pdf](http://www.ulb.ac.be/cours/solvay/vanpottelsberghe/resources/Pap_EINT_2.pdf)

## *Session 8: Qualitative insights into S&T policies*

### Session 8.1.

- Case study: Fiscal incentives for R&D in Belgium

### Session 8.2.

- Entrepreneurship: Legal and regulatory environment

### Reference article

- Independent Expert Group Report to the EC (2003), “Raising EU R&D Intensity - Improving the Effectiveness of Public Support Mechanisms for Private Sector Research and Development: Fiscal Measures”, Luxembourg: Office for Official Publications of the European Communities, pp.37.  
[http://bookshop.eu.int/eubookshop/FileCache/PUBPDF/KINA20713ENC/KINA20713ENC\\_002.pdf](http://bookshop.eu.int/eubookshop/FileCache/PUBPDF/KINA20713ENC/KINA20713ENC_002.pdf)

### Further readings

- van Pottelsberghe de la Potterie B., Megally E. and S.Nysten (2003), “Evaluation of Current Fiscal Incentives for Business R&D in Belgium”, SSTC and CEB Working Papers, pp.62.  
[http://www.ulb.ac.be/cours/solvay/vanpottelsberghe/resources/Pap12\\_SSTC.pdf](http://www.ulb.ac.be/cours/solvay/vanpottelsberghe/resources/Pap12_SSTC.pdf)

## *Session 9: Technology cycles and appropriability*

### Outline

#### Session 9.1.

- The S-curve and disruptive technologies

#### Session 9.2.

- Appropriability and strategy

#### Reference article

- Teece, D. (1986), Profiting from technological innovation: Implications for integration, collaboration, licensing and public policy, *Research Policy*, 15, 285-305.

## *Session 10: The globalization of technology*

### Outline

#### Session 10.1.

- Patent-based measure and quantitative analysis

#### Session 10.2.

- Survey-based measure of drivers

#### Session 10.3.

- Managerial implications

#### Reference articles

- Guellec D. and Van Pottelsberghe B. (2001), "The Internationalisation of Technology Analysed with Patent Data", *Research Policy*, 30.  
[http://www.sciencedirect.com/science?\\_ob=MIimg&\\_imagekey=B6V77-442RF27-6-S&\\_cdi=5835&\\_user=532047&\\_orig=browse&\\_coverDate=10%2F31%2F2001&\\_sk=999699991&\\_view=c&\\_wchp=dGLbVlb-zSkWA&\\_md5=b755f1925636d845ff2a76ab8d6381e5&\\_ie=/sdarticle.pdf](http://www.sciencedirect.com/science?_ob=MIimg&_imagekey=B6V77-442RF27-6-S&_cdi=5835&_user=532047&_orig=browse&_coverDate=10%2F31%2F2001&_sk=999699991&_view=c&_wchp=dGLbVlb-zSkWA&_md5=b755f1925636d845ff2a76ab8d6381e5&_ie=/sdarticle.pdf)
- Zedtwitz M. and Gassmann O. (2002), "Market versus Technology Drive in R&D Internationalization: Four Different Patterns of Managing Research and Development", *Research Policy*, 31(4), pp.569-588.  
[http://www.sciencedirect.com/science?\\_ob=MIimg&\\_imagekey=B6V77-45GJ9CF-6-N&\\_cdi=5835&\\_user=532047&\\_orig=browse&\\_coverDate=05%2F31%2F2002&\\_sk=999689995&\\_view=c&\\_wchp=dGLzVlz-zSkzS&\\_md5=709aa7e7613852bb014fd2496b3d56cc&\\_ie=/sdarticle.pdf](http://www.sciencedirect.com/science?_ob=MIimg&_imagekey=B6V77-45GJ9CF-6-N&_cdi=5835&_user=532047&_orig=browse&_coverDate=05%2F31%2F2002&_sk=999689995&_view=c&_wchp=dGLzVlz-zSkzS&_md5=709aa7e7613852bb014fd2496b3d56cc&_ie=/sdarticle.pdf)

#### Further readings

- Kuemmerle W. (1997), "Building Effective R&D Capabilities Abroad", *Harvard Business Review*, 3/4, pp.61-70.

## *Session 11: Financing innovation*

### **Outline**

#### *Session 11.1.*

- Financing innovation

#### *Session 11.2.*

- The determinants of venture capital

#### *Reference articles*

- Romain A. and Van Pottelsberghe B. (2003), "The Determinants of Venture Capital: A Panel Data Analysis of 16 OECD Countries", IIR Working Paper WP#03-25, Hitotsubashi University IIR, Japan. <http://www.iir.hit-u.ac.jp/file/WP03-25bruno.pdf>

#### *Further readings*

- Bozkaya A. and B. Van Pottelsberghe ( 2008). "Who Funds Technology-Based Small Firms? Evidence From Belgium," Economics of Innovation and New Technology, 17(1-2), 97-122.
- Bozkaya A., Romain A. and Van Pottelsberghe B. (2003), "Surveying Technology-Based Small Firms: A Perspective From Belgium", IIR Working Paper WP#03-23, Hitotsubashi University IIR, Japan. <http://www.iir.hit-u.ac.jp/file/WP03-23bruno.pdf>
- Cassar G. (2003), "The financing of Business Start-Ups", Journal of Business Venturing, 5242, 23p.

## *Session 12: Innovation strategy*

### **Outline**

#### *Session 12.1.*

- Innovation competencies

#### *Session 12.2.*

- Strategic innovation and patenting performances

#### *Reference articles*

- C. Peeters and Van Pottelsberghe B. (2003), "Measuring Innovation Competencies and Performances: A Survey of Large Firms in Belgium", IIR Working Paper, WP#03-16. <http://www.iir.hit-u.ac.jp/file/WP03-16bruno.pdf>
- C. Peeters and Van Pottelsberghe B. (2006), "Innovation strategy and the patenting behavior of firms," Journal of Evolutionary Economics, 16(1), 109-135.