



Degree in Business Economics Academic year 2015/16

Technology Production Cycles (I year, II semester, No 9 CFU)

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LEARNING OBJECTIVES

1. Knowledge and understanding. The course aims to provide students with the basic knowledge needed to analyze and clarify the causes of the changes in production techniques and the effects that these changes create the industrial system. The route chosen for the achievement of these goals is the illustration and analysis of the many attributes of the technology in its continuous dynamism in relation to data relevant phenomena such as the phases of the innovation process, the competitive advantage of technological innovation in the system economic; the types of production structures in relation to the technologies available, particularly within information technology and industrial automation, and the role played by the quality and certification of production cycles.
2. Applying knowledge and understanding. The end result students will have a tool that can provide an overview of the various issues that you need to address in a production environment. In particular, the students, with their knowledge, will be able to carry out the analysis of the production system in which they operate and evaluate technological innovations that assume greater importance in order to achieve competitive advantages business.
3. Making judgments. Teaching, in consideration of the different types of production processes and the ways in which today's industrial production is organized, aims to put students in a position to assess, independently, the inherent qualities of the technologies on the market, their positive and / or negative, both for production and the environment, in order to implement an adequate choice for business needs. With particular attention to the issues discussed, the students at the end of the course are given the opportunity to express independent judgment and to assess and identify which technologies, relating a particular industry, are today the most appropriate to meet the needs of a modern and dynamic company.
4. Communication skills. The student is given an opportunity to communicate and interact with others appropriately using the knowledge gained. In particular it will be able to tackle the problems that will arise with appropriate terminology that will allow him to show communication skills and interaction, also useful for labor relations.
5. Learning skills. In keeping with the themes of the discipline, from the beginning of the course, students are given timely advice and encouragement for a more active participation as possible to the entire educational process and for an improvement in the method of study, the purpose of a more effective learning discipline, presenting precise characteristics in terms of learning, through an appropriate process inductive - deductive. During the lessons the teacher occurs continuously, topic by topic, if the transfer of knowledge takes place effectively, possibly by reviewing the year the method of teaching, in order to better adapt it to the concrete achievement of this important objective, taking into account the actual composition classroom. In this context, the profit is checked by inspection of a natural and consistent corollary of the learning process, which is constantly monitored and improved, also to avoid a traumatic approach to examinations.
6. Verification of this descriptor is carried out both during the lectures, and in the written tests and in the final one.

PREREQUISITES REQUIRED

Basic knowledge of business systems and the factors of production

ORGANIZATION

The course is organized with lectures of two hours each divided into three days a



AND TEACHING METHODS

week; roughly a month of lessons for each module; the teacher has in the classroom slides specially prepared which explains very precisely the course content; also lessons are complemented by discussions on production cycles, witnesses in the courtroom, from case studies, etc. The course, 9 credits, is organized into three modules, each of which 3 ECTS, and requires an overall workload of 225 hours (lectures: 60 hours, individual study: 165 hours). The course is divided into three modules, it is programmed to scan the topics so consequential and homogeneous.

FREQUENCY LESSONS

The frequency of lessons is usually mandatory. The teacher encourages student frequency agreeing with their talks at the end of the form only if you get a minimum attendance at lectures.

INSTRUCTIONAL

Handouts provided to students during the course.

Detailed text:

- E. Chiaccherini – *“Tecnologia e produzione”* – Ed. Kappa, Roma, 2003;
- G. Barbiroli *“Strategie di produzione e dinamica tecnologica”* - Ed. Bulzoni, Roma, 1998;
- Morgante, A. Simboli – *“Tecnologia dei processi produttivi”* – Maggioli Editore, Santarcangelo di Romagna, (RN), 2015;
- Grado, S. Vicari, G. Verona – *“Tecnologia, Innovazione, Operations”* – Ed. Egea, Milano, 2006;
- Galgano – *“La qualità totale”* - Il Sole 24 ore, Milano 1991 e edizioni successive;
- M. Proto – *“Il sistema qualità – Profili tecnici e percorsi evolutivi”* – Ed. G. Giappichelli, Torino, 1999
- E. Leonardi – *“Capire la qualità”* - Il Sole 24 ore, Milano 2000

Progress tests during the course

Talks are scheduled in the pipeline to be agreed at the beginning of the lessons

MARKED TEST

Any evidence of Course

Are not provided

Exam dates

<http://www.economia.unict.it/Didattica/Diario-esami>

DELIVERY MATERIALS

The teacher will deliver classroom teaching materials in the form of photocopies that summarize all the content covered in the classroom and which are the subject exam test.

COURSE

MODULE I (3 credits)

Description of the program. Description of the program. Link between science and technology and dynamic evolution of the technology. The technology in the economy. Technology and related structural and environmental changes. Technology as a function of production and as a system of technical variables. Features of a technology. Evaluation of the "intrinsic qualities of a technology. Life cycle of technology and product. Research, Development and Innovation. Actors Research. The situation in Europe, Italian and Sicilian. Transfer of technology. Partial credit given: 3 credits.

MODULE II (3 credits)

Description of the program. The technology in productive activities. The technologies of the revolution: electronics, microelectronics, nanoelectronics, information technology, telecommunications. Production cycle of pure silicon, the chip and chip. Biotechnology. Automation and control of industrial production with the electronic systems. Automation of the process control and production for parts. MU / NU, industrial robots, AGV, FMS; areas of CAD / CAE, CAPP, CAM. Systems of production flows: the logic and push and pull "just in time". Partial credit given: 3 credits.

MODULE III (3 credits)



Description of the program. The evolution of the concert quality; product quality; total quality. Standardization; quality according to ISO 9000/94, ISO 9000/2000, ISO 9000/2008. The actors of the certification. The certification of products and the business system. Statistical tools for quality control and management tools. Construction quality according to the QFD. Partial credit given: 3 credits.

Arguments

text

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1. Presentation of the matter. The technology in the economic and productive system. Difference between technology and technique. Examples: production cycles of petroleum; electricity production; cement production. Science and Technology. Technological dynamics.
2. Science as a source of Technology: Nuclear energy; materials science solid. Technological progress as the source of new scientific principles: new materials, energy from nuclear fusion. Technology as a system to produce goods and services. Technology and limited resources. Difference between Discovery, Invention and Innovation. Example: fixation of atmospheric nitrogen in ammonia. Innovations in the field of energy: wind energy and photovoltaic.
3. Source of technological innovation: technology push and demand pull. The first technological revolution: the industrial revolution. Innovation of process and product; such as innovations in sulfur. Radical and incremental innovations; change of "techno-economic paradigm" or "technological revolution".
4. Progress Technology and Environment: water pollution, air pollution, soil pollution, thermal pollution and electromagnetic pollution technological accidents. "Sustainable development". Technological progress, transformation socio - economic structure and the industrial system.
5. Production function and factors of production. Technological progress and production function. Technology as a function of technical variables; example: study of the conversion yields of nitrogen-hydrogen mixture for the production of synthetic ammonia.
6. The assessment of the intrinsic qualities of a technology. Types of "indicators": process reliability, uniformity of product specifications, system flexibility, real potential. Environmental indicators. Composite index of quality of the process: the monograms. Appropriateness of technologies. Essential elements of and appropriate technologies.
7. Evolution and life cycle of a technology and a product: characterization of the stages of introduction, expansion and development, saturation, obsolescence. Technology and

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- production costs; vanishing point. Model of product innovation and process. Continuous innovation. Logical process of innovation.
8. Research, Development, Competitiveness. The patent. Analysis of the major industrialized countries. The European knowledge economy. Community policies on innovation. The "Lisbon Strategy": key policy priorities.
 9. Economic development, innovation and competitiveness in Italy. Technology Balance of Payments in Italy. Transfer of technology: advantages and disadvantages. Transfer of Rights of industrial property: patents, trademarks and designs, know-how.
 10. Contracts of transfer. Licensing (license); Joint venture; direct investment agreements participatory, contract manufacturing, Venture Capital. Services related to technology transfer Success factors for the transfer of technology. Main forms day Payment.
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1. Evolution of the technology, types and forms of technology: technology hard, intermediate, appropriate. New technologies "high-tech" or "science-based". Technologies in productive activities: traditional technologies, traditional technologies, mixed technologies, intermediate technologies. New technologies. The electronics and microelectronics.
2. The electronic structure of solids: electrical conductivity and semiconductor. Semiconductor materials. Silicon; silicon technology; preparation of the silicon slices. The technology of 'gallium arsenide, optoelectronics, fiber optics. Other semiconductors.
3. The evolution of electronics: development of electronics and microelectronics, the microprocessor; chip, Moore's Law, the main features of some microprocessors. Production cycle of the microchip. Operation of sawing (cutting), and encapsulation of the chip; the market and the prospects of microelectronics.
4. Limits of semiconductor technology; Nanotechnology. Carbon nano tubes, graphene, biochips, photonics and nano photonics microcircuits "photonic" Your computer optical and nano machines.
5. Biotechnology. Scientific principles and application sectors: agribusiness; Diagnostic Medical; environmental; mining; energy; in the production of chemicals (specialties and commodities). Development of biosensors and biochips. Prospects of biotechnology.
6. Automation of industrial production. Historical and technical aspects of automation. Automatic production cycle. The automatic control of production processes

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with the electronic systems. Automation of process control. Evolutionary stages of the process control.

7. Automation of production parts Rigid automation, programmable, flexible. Transfer lines and the assembly line.
8. Automation of production parts Rigid automation, programmable, flexible. The devices of flexible automation. CNC machine tools, industrial robots, handling systems.
9. The flexible systems of producing and their configurations productive.
10. Technologies with the aid of the computer. Area design and engineering (area CAD/CAE). FEA. Planning the production process (CAPP system/GT). Automated management of production systems.
11. Area planning systems and production control production management. The "lead time". Techniques of production management: and logical pull and push.

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1. Definition of quality. Historical evolution of the concept of quality. The concept of quality as "control". Quality as a system.
2. Quality and standardization. Standardization bodies. To ISO 9000. The guiding principles of the Standard. From ISO 9000 to Vision 2000. The Deming wheel – PDCA.
3. The ISO 9001/2008. The clauses of ISO 9001/2008. The documentation of the quality pyramid. Management procedures and operating procedures. Work instructions and records.
4. Voluntary certification. The Quality System Italy: Certification bodies. Accreditation bodies: From Sincert to Accredia. "Multilateral Agreement".
5. Steps to achieve certification. Practical implementation of a quality system; drafting of the Quality Manual.
6. The quality of services. The quality circles.
7. The QFD. Construction quality.
8. The seven instruments statistic quality. The seven tools of quality management. The CE mark. Closing of the course.

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- Morgante, A. Simboli – “*Tecnologia dei processi produttivi*” – Maggioli Editore, Santarcangelo di Romagna, (RN), 2015.
- A. Galgano – “*La qualità totale*” - Il Sole 24 ore, Milano 1991, ed edizioni successive.
- M. Proto – “*Il sistema qualità – Profili tecnici e percorsi evolutivi*” – Ed. G. Giappichelli, Torino, 1999.
- E. Leonardi – “*Capire la qualità*” - Il Sole 24 ore, Milano 2000.

Examples of questions and / or exercises frequently

1. Difference between technology and technique. Examples. Science and Technology. Discovery, Invention and Innovation. Industrial Revolution. Radical and incremental innovations, process and product; examples. Forms of pollution and
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sustainable development. Technological progress and production function. Technology as a function of technical variables; example evaluation of the intrinsic qualities of a technology. Appropriateness of technologies. Life cycle of a technology and a product. Vanishing point and model of product innovation and process. Research, Development, Competitiveness. The patent. The European economy of knowledge and policies in terms of innovation. Transfer of technology.

2. Technologies in productive activities. New technologies. The electronics and microelectronics. Semiconductor materials. Silicon; silicon technology; preparation of the silicon slices. Gallium arsenide, optoelectronics, fiber optics. the microprocessor; chip, Moore's Law, the main features of some microprocessors. Production cycle of the microchip. Operation of sawing (cutting), and encapsulation of the chip; the market and the prospects of microelectronics. Nanotechnology. Biotechnology. Automation of industrial production. Rigid automation, programmable, flexible. Process automation and production for parts. FMS. CAD; CAE, CAPP, CAM; FEA, CAP. Management pull and push.
3. Definition of quality; pyramid of quality; the quality manual; certification process quality; standards of quality management; statistical tools for quality control of the company; in the quality of services; managerial tools for quality control in the company.

*** minimum knowledge essential for passing the exam**
