

Methodology, Quality and Personal Abilities (MCHP)

Course description

Carlos A. López Barrio

Giorgos Kontaxakis (coordinator)



Departamento de
**Ingeniería
Electrónica**

Universidad Politécnica de Madrid

Máster Oficial en Ingeniería
de Sistemas Electrónicos

www.die.upm.es



Index

Methodology, Quality and Personal Abilities.....	3
Objectives.....	3
Programa.....	7
Bibliography	9
Teachers	9
Teaching Methodology	12
Evaluation.....	13
Contact	13



Methodology, Quality and Personal Abilities

Number of credits: 5 ECTS (3 ECTS theory, 2 ECTS practical).

Semester: 2

Type: mandatory

Objectives

In this Master's Degree, Electronic Systems Engineering takes a systematic and overall approach, as opposed to the traditional one which is more oriented to components or circuits, but this approach is also necessary and is present in some of the subjects taught. The main objective of electronic systems engineering is to apply an interdisciplinary approach to studying and understanding the needs that arise and, by adopting a systemic paradigm, to design, implement, validate, optimize and maintain complex electronic systems in multidisciplinary settings. In this process of structured creation and development, the quality metrics for the creation of the results, and very often the need to rely on the methodologies of systems' science and other disciplines of engineering to design and deliver tangible products that represent the implementation of these systems should be taken into account.

An Electronic Systems Engineer must currently face a very high complexity and considerable diversity of components that compound the systems with which he works: hardware, software, people, etc. to which the large number of necessary knowledge and of information available must be added. Moreover, all these components interact with each other and must respond to the growing requirements, posed by a variety of stakeholders: employers, customers, regulators, technology providers, market, economic and financing aspects, etc.

The "Methodology, Quality and Personal Skills" course is the mainstay of the multifunctional and interdisciplinary training that is intended to be offered to participants, both those who choose professional development of an industrial nature, and those who are in their doctoral training stage. The adopted approach aims to bring the students to an integral training, not purely technical, based on their ability to enhance innovation, communication, leadership, finding

relevant information and documentation, and understanding of the market, developing their creative abilities and learning throughout term.

Given the ambitious objective, the scope of the course will focus on going through the fundamental aspects of some of these dimensions, starting a path which everyone must take throughout their career. The course consists of three main blocks:

- Approach towards system engineering projects: project financing, development methodology, quality assurance and environment, management of intellectual and industrial property.
- Approach to information and documentation: documentation sources, services and documentation centers, search and document retrieval on the Internet, writing and

publication of research and development and innovation projects, support techniques to the oral presentation for the defense of research projects.

- Approach to personal and professional skills: methods for accessing a job, methods of communication and negotiation, leadership, conflict management, time management. relevant information and documentation, and understanding of the market, developing their creative abilities and learning throughout term.

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To who is it addressed?

To the (Systems) Engineer:

Any engineer, by definition, is called to conceive and design systems that solve society's problems. To carry out this task, is not enough to know the technological aspects, though this

is often almost the sole focus that is put into their training. Reality must take into account many other factors such as:

- In the development is vital to follow an appropriate methodology to ensure that the product is obtained with the functionality specified in the time and cost agreed, that is, with quality, meeting environmental requirements, etc.
- The project must be carried out under reasonable cost parameters and must contribute to the viability of the company that puts it on the market (financial aspects).
- The project results should be protected as regards the intellectual property of the creator and at the same time may be published for dissemination to society.
- Similarly, and perhaps at an earlier stage, it is necessary to have all the documentary information necessary for the development of work.
- Engineers must be able to assess the importance of the documentary sources and select those that are most interesting in order to publish projects. In addition, engineers must have the ability to produce documents and prepare presentations that enable them to disseminate the results of his work.
- Finally, these activities are carried out by people, who form the fundamental value of any organization and, in many cases, turn out to be framed in a business environment. It is key, therefore, to know aspects related to personal and professional skills.

The course is aimed, therefore, at any engineer, whose activity will typically be carried out in collaboration with others within an organization, be it a company, a university or an R&D center. Mainly, however, it is intended for engineers interested in keeping informed and trained to maintain their competence, strive to advance in the useful knowledge of their profession and provide professional development opportunities for themselves and their colleagues. In this sense, the system engineer to who takes this course must have a clear interest in promoting R&D tasks and participate in them within their professional environment, including, of course, those engineers who currently carry out scientific research in the development framework of their doctoral thesis.

Educational Objectives of the course

The objective pursued is to provide a first contact with this large set of issues, key to the development of professional life and that are usually relegated in the engineers' training.

For the variety of topics to be covered, only an overview of each will be provided, placing a certain emphasis on some important point.

The bibliography and documentation provided should serve as a starting point for further individual work for training that should continue throughout professional life.

Students who have studied this subject will get sufficient training to be proficient in:

- Describe the phases of a development methodology and operation of a system, as well as project management.

- Select and apply appropriate methodology to any project.
- Remember the standards and quality assurance models and the tools available.
- Describe the environmental management system and its evolution.
- Describe tools for the investment analysis and strategies and funding mechanisms.
- Analyze investment alternatives for the development of a draft business.
- Describe the management tools of intellectual and industrial property, as well as the technological patent reports as important levers of innovation and competitiveness.
- Search and retrieve documental information for the development of any work of R&D&I.
- Assess the importance of documentary sources and select those that are most interesting in publishing the projects.
- Develop documents and prepare presentations to enable them to disseminate the results of their research projects.

Describe the aspects that deal with people and their professional development in business or organizations: competency development, knowledge management and talent management.

- Apply the basic tools in the negotiation and management of conflicts.
- Understand and apply the techniques that make effective a communication, at a personal and professional level.
- Implement a skills-based approach in curriculum design and prepare, submit and effectively manage a job application.

The overall objective of the course is to focus on the skills of the participant who must be able to incorporate not exclusively technological aspects, which are important in the field of engineering systems, both electronic and any other kind.

Also, indirectly, seek to aim for the subject of handling a range of topics not strictly technical and the sources of information related to them, so the engineers are in a position to continue their work of self-training or training with courses having identified the importance of these subjects and develop the ability of bibliographic research, individual work, report writing and team work.

Programa

Topic 0 – Introduction to the subject. Opening lecture: "Competitiveness and Career Success: Some challenges of the twenty-first Century".

Topic 1 - Methodology of project development: A brief description of the life cycle phases of a system and the methodologies and techniques that are usually applied to both the development and management of the project will be presented.

Topic 2 - Quality Assurance and Environment: There will be a description of the principles, tools and usual practices to implement a system of quality management and environment in an organization, oriented towards continuous improvement.

Topic 3 – Project funding: Beyond the technical, organizational, human or institutional aspects it is always necessary to take into account the importance of the financial aspects of project development. It seeks to highlight the basic tools for effective financial management, financial feasibility analysis of a business or project, and environmental conditions. On the other hand, it aims to explain the principle of financial intelligence and discuss techniques to develop and use it effectively.

Topic 4 - Management of Intellectual and Industrial Property (IIP): Obtaining new knowledge and its subsequent operation are among the goals of both research groups from universities and innovation activities of enterprises. This knowledge can be obtained in many different ways, however in any case or procedure, knowledge can be protected, managed and acquired. The management of intellectual and industrial property is a key aspect for which records, procedures and institutions are available at a state and world level that has to be known both by university's research group and the company's innovation department.

Topic 5: Methodology and scientific documentation: Whether in an industrial/business environment as an academic/university environment, where tasks and R&D&I projects are raised and carried out, the search and retrieval of documentary information is essential for the development of any project. In a series of lessons, it is sought therefore to prepare students to assess the significance of the documentary sources, select those that are the most interesting in publishing their work and produce documents and prepare presentations that enable them to disseminate the results of their work.

Topic 6: Methodology to access a job: The first stages in the search for a job include the need to communicate to the company to which the candidate wishes to join, his personal and professional background, knowledge, preferences, talents, abilities, skills or attitudes.

The means by which a candidate typically transfers these issues to a company is usually a covering letter, a resume (or CV) and one or more personal interviews. Knowing how to use these means adequately, contributes decisively at the time of accessing a job.

Good writing and quality in content and structure of a covering letter or a resume, as well as the good development of an interview, at the time of trying to get a job, are vital since they

are very common and initially the only way to give the company requesting the new professional profiles, a first impression of the candidates.

Knowing and applying these tools optimally constitutes the aim of this lesson, and allows benefits to students in finding employment to be provided.

Topic 7: Communication: Communication is a competition that integrates many skills and attitudes such as speaking, declaring, listening and many other capabilities that we have never associated with communication and whose mastery is essential both at a personal and professional level.

To value the importance of communication is worth a mere thought, from the professional point of view on how to intervene in practically in all areas of business management: negotiating, selling, writing reports, communicate the team, make presentations, etc.

This lesson aims to show, ponder and debate those elements that conform the concept of communication in a broad sense, both from a theoretical point of view and through carrying out practical experience.

It is important to understand the elements that affect communication, verbal and nonverbal, and know the basics that make it effective, trying to improve the current abilities of students in this means of communication.

Topic 8: Negotiation: We consider negotiating as the relationship between two or more people, leading to reaching an agreement on a topic that hold different positions, trying to get the maximum benefit for all. Also, as a result of negotiations, it aims to achieve the compliance and satisfaction of all parties involved.

Negotiation is part of everyday activities, both personal and professional. From this standpoint, there are many examples where bargaining is essential, as in the relationship with suppliers, customers, others in the company, Public Bodies, etc.

It is a class objective that students understand the negotiating process through the knowledge and mastery of the key elements involved in it.

In short, it seeks to highlight the different aspects that influence effective negotiation, trying to improve this competence of the student, through a theoretical and practical learning.

Topic 9: Leadership, conflict management, time management and planning: In this last issue a review will be made of personal skills and professional competencies a systems engineer who intends to lead projects and research work, development and innovation in their work environment should have. An oral presentation is made on a list of keys to success for a professional in the sector, such as competitiveness and leadership in the twenty-first century, the relationship of change and people, skills development, knowledge management, talent management, "I" management and leadership, conflict management, time management and the importance of proper planning.

Bibliography

Given the variety of topics, a single text is not proposed for monitoring the course. Specific documentation for each subject will be proposed, as well as access to the slides that are used to present and summarize each of the issues.

Teachers

The variety of topics covered under this course, associated with the complexity and breadth of each justifies intervention in the classes of a number of experienced teachers higher compared with the other subjects of this Master.

The teaching of this course consists of the following experts:

Giorgos Kontaxakis (coordinator): Electrical Engineer by National Polytechnic University of Athens, Greece, and a Ph.D. in Biomedical Engineering from the State University "Rutgers" New Jersey, USA. He has conducted research in Nancy, France in Frankfurt and Heidelberg, Germany, and Sydney, Australia, and has been manager of European R & D at the Fraunhofer Institute in Darmstadt, Germany. Since 2000 a member of the research group "Biomedical Imaging Technology" in the Department of Electrical Engineering School of Telecommunications Engineering of the UPM (ETIST-UPM), where he is currently professor. It was co-founder Aktina Consulting SL, based in Madrid, and for the past 10 years plays and giving advice to the European Commission assessment. He has worked closely with the Chair Sanitas (2008-2010) and the Technology Innovation Group ETSIT-UPM since 2010. In the area of research, its main interests lie in the field of medical imaging and the application of information technology and communications in the field of health. He has published over 50 scientific articles in international journals and book chapters, and has authored or co-authored more than 130 papers at national and international scientific conferences.

Juan Luis Bravo Ramos: Degree in Information Sciences and PhD in Journalism from the Universidad Complutense de Madrid. He is currently Associate Professor at the Institute of Education Sciences of the University of Madrid, and Head of Audiovisual Instructional Resources Division. He has organized and taught courses related to the use of teaching aids, with special attention to the educational video and the Information Technology and Communication, for teachers of all levels of education and other institutions or companies. In the field of research is currently working on issues of application of archaeological engineering technologies, and the development of new models museological documentation and dissemination. Participate in the research project Sharjah Cartographic Research conducted within an agreement between the UPM and the United Arab Emirates, and the European Network of Excellence EPOCH (European Research Network on Excellence in Processing Open Cultural Heritage). From the year 1987 has published numerous research articles and conference papers, and numerous other papers, many of which are available on its Web staff (<http://www.ice.upm.es/wps/JLBR/>).

Carlos A. Lopez Barrio: Telecommunications Engineer and PhD from the University of Madrid and University Professor in the Department of Electronic Engineering ETSIT-UPM. Sanitas has directed the Department of ETSIT-UPM (2007-2010). Currently Director of the research group "Laboratory of Integrated Systems" (LSI) and the "Technology Innovation Group" (GIT), both ETSIT-UPM. In his long career he has been a member of the National Microelectronics Centre (CSIC), Director of Innovation at Telefónica R & D; ADG Technology and Networks at Telefonica, SA and Telefonica of Spain, Spanish representative in the Programme Management Committee of Information Technology (ESPRIT) and member of ISTAG (Information Society Technologies Advisory Group), both from the European Commission Spanish Speaker in the European debate on the Green Paper Innovation, sponsored by the European Commission. During 2010 he was Deputy Rector for General Coordination of Moncloa Campus of International

Excellence. Carlos Lopez Barrio has performed, among others, the Programme of Business Management (PADE) at IESE Business School. His research interests are focused for years on: microelectronics, digital architectures and tools for the automatic design of electronic systems, which have been derived publications and communications at national and international conferences and more recently into the management aspects of innovation.

Guest lecturers:

José María Cavero Clerencia: Telecommunication Engineer by the UPM. He has spent practically his entire career in Telefónica and Telefónica I + D, where he was responsible for various areas related to reliability and quality, driving the system design and implementation of quality management in organizations where he has worked. In the last 15 years has been Director of Planning and Control of Telefónica I + D falling under his area of responsibility of the quality management, management of R & D, technology management, financial management, procurement and sales of the company, taking charge of the design and implementation of the management system of R & D and developing different management tools such as Balanced Scorecard or Innovation Model. Collaborates with various forums and associations on issues related to quality and R & D, such as AEC, where he has been chairman of the Reliability Committee, the Management Excellence Club, where he has collaborated in the development of the Framework on Innovation, and AENOR, which holds the secretariat of the Technical Committee 56 "Reliability" and which has been active in the development of regulations on management of R + D + i. He teaches CEPADE and UP Comillas, where he teaches courses related to quality management and R + D + i and collaborates with ETSIT through the Technology Innovation Group, where he has conducted surveillance reports and technological studies on e-Health.

Isidoro Padilla Gonzalez: Telecommunication Engineering from UPM. Diploma in General Management at IESE, PDG Diploma in Advanced Studies from the UPM 2006, Systems Engineering for Intelligent Environments, Diploma in Management of Science and Technology of the Community of Madrid, Certificate in Project Management Multinational Rights Certificate Intellectual Property, Certificate in Competency-based Training, Certificate in Preparation of Proposals to the 7th Framework Programme of the European Union, Certificate in Evaluation of R & D, independent consultant in the areas of knowledge management, innovation management, engineering ICT processes. Company Founder and Knowledge Engineering Consulting, SL Professor Pro Bono in ETSIT-UPM. Professor of Innovation Management applied in CEPADE of UPM. Senior lecturer at the European University of Madrid and the University Lasalle in areas of Electrical Engineering and Innovation Management. From your career history is remarkable: Chief Executive Officer and Vice President of Telefónica I + D, Development Director Telephone Services, Member of Educational Innovation Group of the UPM GRIDS. Member Secretary of the External Review Committee for the Department of Telematics Engineering of the U. Carlos III of Madrid. Member of the Chair Sanitas ETSIT-UPM, Barcelona Technology Advisor, Chairman of the Innovation and Technology Transfer ANIEL. Member of the Commission COTEC Innovation.

Diego Ruiz Quejido: Telecommunication Engineer by the ETSIT of the Polytechnic University of Madrid, his career has been linked to Telefónica Group. After discussing his career as a development project manager at the Center for Research and Studies of Telefónica in 1988 participated in the definition and creation of Telefónica Research and Development, in charge of Strategic Planning Division, Methodology and Quality. To date, he has held various positions of responsibility in Telefónica I + D, as Director General of Management Control Director Innovation Management and Resources and Director of Planning, Control and Resources. Has been a member of the Steering Committee and the Executive Committee of Telefónica I + D, and corporate secretary of the Telefónica Group Innovation and Scientific Advisory Council of

Telefónica I + D. He has also been a member of the Advisory Committee of the Accreditation Agency Research, Development and Technological Innovation (AIDIT) and the Advisory Council of the National R + D + i. He collaborates COTEC Foundation, Foundation whose mission is to contribute to development through the promotion of technological innovation in the company and in Spanish society. He teaches at the International Summer School of the University of Comillas, where he teaches Quality Management. He has worked in the Department Sanitas ETSIT-UPM and currently working in the Technology Innovation Group (GIT) of ETSIT-UPM.



Teaching Methodology

By being a graduate course with a high percentage of students already at their professional stage, the teaching methodology that is going to be used is the one called b-learning (blended-learning: mixed attendance and virtual), with an important part of the virtual weighted.

The virtual environment is, therefore, a key component in the process and therefore requires an effort of personal work from the student to traditional classroom courses. A platform (Moodle) that will support the "MSE-Virtual" web (the web of the Master in Electronic Systems -MSE-) is used for this purpose where there will be a specific site for this course. In it the student will find:

- An overview of the course, announcements, information about the teachers in each topic.
- Documentation and exercises, as well as formats required for papers (either exercises or projects).
- Calendar and syllabus, specifying the scheduling of the attendance classes.
- Forums for virtual tutoring, questions, open discussions between students and teachers, etc.
- Mailbox to hand out different papers.
- Web links to external documentation.

The classes will be reduced to one every week, three hours per session (below you can see the specific timetable of this course).

In general terms, the route to follow during the development of the course will be as follows:

- The subject to be studied in each course topic will be indicated. The details can be found in the syllabus published in the Moodle.
- Concerns that may exist may be resolved in the corresponding forum, either among students (which is encouraged and will be assessed) or by the teacher.
- Exercises or case studies to be carried out individually or in groups, as indicated in each case may also be proposed. The due date will be fixed in each case, but always within a maximum of 24 hours before the next class.
- In each class, following the specific agenda established and published on the website of the course, the teacher can make a small presentation of the more complex parts to consider or that have generated the most questions. A part to resolve any questions that may arise will also be devoted by writing at the beginning of class (this document is considered a task at the evaluation process, if it is stated in the syllabus of each class). It may also be solved by some exercise or discussing any issue that may arise.

In addition to the virtual tutoring through forums, as mentioned before, there is the possibility of personal tutoring with the teacher during the times indicated further on, or, where appropriate, by appointment to be agreed with the teacher at the request of the student.

- Throughout this process it is key to keep up with the pace of the course as both the tasks and active participation in forums and virtual environment as a whole, will have a weight on the final assessment and facilitate the monitoring of the course. This ease is what makes the approach didactical.
- Participation made in lessons and in the virtual environment will be especially valued (see the Evaluation section), since the learning of this topic must be the result of a personal assimilation through the contrast of ideas with others.

Evaluation

Evaluation will be based on the following parameters:

- Participation in forums and activities in Moodle (15%).
- Attendance and classroom participation (15%). It is required a minimum attendance of 80%.
- Submission of individual or group work, class controls (40%). In preparing these deliveries will make use of extensive documentation, which may not be exempted from a personal elaboration. The use of material obtained directly from a source (article, magazine, book, internet, etc..) Without mentioning its origin is considered plagiarism. If malfunction is detected in any work situation, the grade for the course will hold both the June session and July. The controls in class (planned for a couple of times) will be notified in advance and cover the material covered to date and since the beginning of the course or the previous control.
- Final exam (30%). Must obtain a minimum of 55 points out of 100 (otherwise the grade will be suspended, regardless of other qualifications). Consist of a series of questions on issues covered in the course (without books or notes).

From the above it should be noted the importance of continuous monitoring of the subject, as well as take advantage of forums, hours of tutoring and classroom for outstanding leave no doubts that may impede progress regularly. It is basic, too, the study of the material to be indicating before boarding any practical work. Leave all the effort to the end is almost guaranteed not to pass the course.

Contact

Timetible **Appointment is recommended to meet with each teacher.**

Teachers Coordinator: Giorgos Kontaxakis

Thursday 12:00 - 14:00.

Place: Despacho C-201, ETSI Telecomunicación

Email: g.kontaxakis@upm.es

Teacher: Carlos A. López Barrio

Thursday 13:00 - 15:00.

Place: Despacho C-222, ETSI Telecomunicación

Email: barrio@die.upm.es

Teacher: Juan Luis Ramos Bravo

Place: Instituto de Ciencias de la Educación, ETSI Caminos

Email: juanluis.bravo@upm.es

Invited teachers:

José M^e Cavero Clerencia: caverojm@gmail.com

Isidoro Padilla González: ipadilla@die.upm.es

Diego Ruiz Quejido: drquejido@gmail.com

Administration Mariano González Bedmar: mariano@die.upm.es

Informatics support Francisco Romero Izquierdo: romero@die.upm.es
