



UNIVERSIDAD DISTRITAL
FRANCISCO JOSÉ DE CALDAS

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FRANCISCO JOSÉ DE CALDAS
FACULTAD DE INGENIERIA

SYLLABUS

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FACULTAD DE INGENIERÍA
Maestría en Ciencias de la
Información y las Comunicaciones

Masters in Information and Communication Sciences

Emphasis

NAME OF THE SUBJECT: Mobile Cellular Networks.

- Obligatory (X): Basic (X) Complementary ()
- Elective (): Intrinsic () Extrinsic ()

NUMBER OF ACADEMIC CREDITS: Four (4).

COURSE TYPE: THEORETICAL: X PRACTICAL: ___ THEORETICAL-PRACTICAL: ___

Methodological alternatives:

Master Class (X), Seminar (), Seminar - Workshop (), Workshop (X), Practice (),
Tutored projects (), Other: _____

Justification

JUSTIFICATION:

As telecommunication networks include a series of interconnected devices, in order to support the information transmission in electronic format. A set of mobile devices that are connected by wireless links (radio) is required. It is when it has cell-based mobile networks, which are communications networks formed by devices that can change their location in any time.

PREREQUISITE/PREVIOUS KNOWLEDGE: Communications.

Content



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GENERAL OBJECTIVE

To study the theoretical and practical topics as well as the techniques, technologies, applications and services involved in cell-based mobile networks and their interrelationships with Teleinformatics.

SPECIFIC OBJECTIVES

- To understand the current basic concepts in mobile communications systems.
- To identify the basic aspects of mobile radiotelephony systems.
- To establish the concepts relating to cell-based mobile systems.
- To identify and differentiate each characteristics of 1G, 2G, 3G and 4G mobile systems.
- To understand the elements in current satellite mobile telephony system.
- To establish the differences in current global positioning systems.
- To understand the MAN and WAN mobile systems.

SYNTHETIC PROGRAM:

1. Basic Concepts in mobile systems.

- a. Radio communication Systems.
- b. Mobile systems historical evolution.
- c. Antenna characterization and radio interface parameters.
- d. Propagation concepts in mobile Channel.
- e. Estimation methods for propagation losses.
- f. Networks traffic and sizing.

2. Mobile Radiotelephony Systems.

- a. Basic aspects and signalling.
- b. DECT private System.
- c. TETRA private System.

3. Mobile cellular Systems.

- a. Cell system concepts.
- b. Cellular system structure.
- c. Interference estimation.
- d. Capacity of mobile cellular networks.

4. 1G and 2G mobile systems.

- a. TACS and AMPS Systems.



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- b. Signalling System number 7.
- c. Channels, network architecture and management system of TACS and AMPS systems.
- d. GSM System features.
- e. Channels, bursts and coding.
- f. GSM network Architecture and management.

5. Satellite telecommunication systems.

- a. TACS and AMPS Systems.
- b. Aspects of satellite propagation.
- c. Modulation and multiple access.
- d. Satellite Links.

6. Satellite mobile phone System.

- a. Technical Aspects.
- b. System Architecture.
- c. System services and operation.

7. Global Positioning Systems.

- a. American System.
- b. Russian System.
- c. European System.
- d. Chinese System.

8. 3G and 4G Mobile Systems.

- a. GPRS System.
- b. EDGE System.
- c. IMT-2000 System.
- d. UMTS System.
- e. Aspects of UTRAN.
- f. HSPA System.
- g. LTE System.

9. MAN and WAN Mobile Systems.

- a. IEEE 802.16 System.
- b. IEEE 802.20 System.
- c. IEEE 802.22 System.



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d. IEEE 802.24 System.

Strategies

METHODOLOGY:

It is oriented to the development of analytical capacity of mobile communication systems. For this, they are carried out: lectures in class by the teacher, collaborative work with the student's theoretical practical, evaluations, examinations and research work. Practical exercises are developed when the subject requires it. Research seminar and case study. Workshops will allow students to deepen and experiment around the subject concepts, generating new proposals and alternatives to those treated in the course.

| Type of course | Hours | | | Teacher hours / week | Student hours / week | Total Hours Student / semester | Academic credits |
|----------------|-------|----|----|----------------------|----------------------|--------------------------------|------------------|
| | DW | CW | AW | (DW + CW) | (DW + CW +AW) | X 18 weeks | |
| | 3 | 1 | 8 | 4 | 12 | 192 | 4 |

Direct Classroom Work (DW): classroom work in plenary session with all students.

Mediated-Cooperative Work (CW): Teacher tutoring work to small groups or individually to students.

Autonomous Work (AW): Student work without the presence of the teacher, which can be done in different instances: in work groups or individually, at home or in a library, laboratory, etc.)

Resources

PHYSICAL RESOURCES REQUIRED:

- Media and help resources: Presentations of the theoretical topics and printed medium delivered at the beginning of the course. Slides and display of computer images through video-beam.
- Virtual Classrooms: they are a virtual learning space where is possible to share specific information of each study area and it is organized by curricular projects. To learn more go to the following web site <http://aulasvirtuales.udistrital.edu.co/> or contact the Engineering faculty systems room manager.
- Institutional Mail: It is by means of which information is received from the Universidad Distrital and it can be used for different purposes without affecting the individual or



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collective security of people or institutions. Students and teachers may request their institutional and key mail in the coordination to which they are affiliated or in the System Advisory office at 40th Street University headquarters.

- Institutional Web Portal (IPW): It is the virtual space where everybody can share the information of a specific area in a public way. It can be created by a teacher to upload information about the academic spaces or projects. Also, students can create them in individually or collectively way, the hotbeds, research groups, as well as the various academic or administrative figures that require the use of this resource. To See examples go to: <http://comunidad.udistrital.edu.co/hzuniga/> or <http://www.udistrital.edu.co/wpmu/> to Register and create an IPW go to: <http://comunidad.udistrital.edu.co/wpsignup.php>.

BIBLIOGRAPHY:

- JOHN WALKER. "Advances in Mobile Information Systems". Editorial Artech House.
- JOSÉ M. RÁBANOS. "Mobile Communications". Editorial Centro de estudios Ramón Areces.
- A BRUCE CARLSON. "Communication Systems". Editorial Mc. Graw Hill.
- B. P. LATHI. "Communication Systems". Editorial Mc. Graw Hill.
- WAYNE TOMASI. "Electronic Communication Systems". Editorial PRENTICE HALL HISPANOAMERICANA SA.
- LEON W. COUCH "Analog and Digital Communication Systems" Editorial Pearson-Prentice Hall.
- K. SAM SHANMUGAN. "Digital and analog communications systems. Editorial JOHN WILEY.

BIBLIOGRAPHIC RESOURCES:

- IEEE Database
- SPRINGER Database
- ELSEVIER Database



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Evaluation

ASPECTS TO EVALUATE

It is important to take into account the differences between evaluating and qualifying. The first is a qualitative process and the second is a quantitative terminal state. The evaluation criteria must be previously known by the students. In Order To obtain the necessary information for the evaluation processes, it is necessary to design different specific formats of self-evaluation, co-evaluation and hetero-evaluation. Competency-based training requires:

1. Assessment of student learning in their dimensions: individual/Group, theory/practice, written oral.
2. Self-evaluation: The evaluation of the student's performance.
3. Co-assessment of student and teacher performance.
4. Evaluation of teacher performance.

The evaluation will be carried out taking into account:

| | TYPE OF EVALUATION | DATE | PERCENTAGE |
|-------------------------|--------------------------------------|------|------------|
| FIRST GRADE | Workshops reports | | 20% |
| | Papers analysis and its presentation | | 15% |
| SECOND GRADE | Workshops reports | | 20% |
| | Papers analysis and its presentation | | 15% |
| THIRD GRADE | Workshops reports | | 15% |
| | Final course report | | 15% |

PROFESSOR INFORMATION:

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