HW, SW & SYSTEMS INFRASTRUCTURE

BACHELOR IN MANAGEMENT INFORMATION SYSTEMS

Professor: MARIANO ALVAREZ DIENTE

E-mail: mad2@faculty.ie.edu

Academic year: 18-19
Degree course: THIRD
Semester: 1º
Category: COMPULSORY
Number of credits: 6.0
Language: English

PREREQUISITES

SUBJECT DESCRIPTION

In our current competitive environment, building a flexible and robust information systems infrastructure (ISI) plays an essential role in companies. Over the past 25 years, the IS architecture has evolved from mainframe computing to client–server computing and now component-based Internet computing. This course aims at knowing and understanding this evolution and it is mainly focused on the networking elements (wired and wireless), protocols, services and architectures a successful organization needs to rely on and implement in order to properly compete in the market.

On the other hand, many actual digital businesses are heavily supported by technology building blocks required to enable them new capabilities and business models. This course also focuses on this recent approach.

OBJECTIVES AND SKILLS

At the end of this course students should be able to:

- Know and understand the main information systems that experts implement in order to help companies gain and keep their competitive advantage
- Identify and select the resources in the form of hardware, software and systems infrastructure a company needs to fulfill their requirements
- Discuss the process of information systems innovation as a socio-technical endeavor that comprises both technology and organizational change.
- Select the elements and components required to interconnect IP systems and devices.
- Learn to configure some networking devices which enable companies to create interconnections with IP ecosystems.
- Plan and design the basic structure of digital businesses based on technology platforms.

METHODOLOGY
<table>
<thead>
<tr>
<th>Teaching methodology</th>
<th>Weighting</th>
<th>Estimated time a student should dedicate to prepare for and participate in</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lectures</td>
<td>13.34 %</td>
<td>20 hours</td>
</tr>
<tr>
<td>Discussions</td>
<td>6.67 %</td>
<td>10 hours</td>
</tr>
<tr>
<td>Exercises</td>
<td>33.34 %</td>
<td>50 hours</td>
</tr>
<tr>
<td>Group work</td>
<td>13.34 %</td>
<td>20 hours</td>
</tr>
<tr>
<td>Other individual studying</td>
<td>33.34 %</td>
<td>50 hours</td>
</tr>
<tr>
<td>TOTAL</td>
<td>100.0 %</td>
<td>150 hours</td>
</tr>
</tbody>
</table>
PROGRAM

SESSION 1

Course introduction
- Objectives, methodology and conditions
- Systems infrastructure evolution

SESSION 2

Networks Implementation

Wired and Wireless
- Physical media
- Common network media
- Brief introduction to wireless media
- Structured cabling

SESSION 3

The access part
- Elements: HUBs, switches and additional elements

Practical Exercise

SESSION 4

L2 Trunks
- Switching, connectivity, trunking

Practical Exercise

SESSIONS 5 - 6

Networks and subnetworks
- IP addresses and its evolution
- Classes of IP addresses and subnet masks
- IP addressing
- Subnetting
- Private networks
- VLSM (Variable Length Subnet Mask)
- CIDR (Classless Interdomain Routing)

Practical Exercises

SESSION 7

Segmentation with L3 Trunks
SESSIONS 8 - 9
Dynamic routing, RIP
- Protocols
  - Everything in a single location: VLANs and SVIs
  - MLS (Multi-Layer switching)
Practical exercises

SESSION 10
Backups, TFTP server
- TFTP Protocol
Practical exercises

SESSION 11
Domain Name Systems
- Implementation and types
- DHCP
- Practical exercises
  - Domain Name Systems
  - Implementation and types
  - DHCP
Practical exercises

SESSIONS 12 - 13
Proprietary vs. outsourced web services
Connections with the Internet
Integrated services router
xDSL
Fiber optic cable
Introduction to IPv6

SESSION 14
Mobile and WLAN implementation
Wireless networks essentials
- Signals, modulations, channels, electromagnetic spectrum
- Properties of Waves
- Units
SESSION 15
Regulatory bodies and radio spectrum management
  - Licensed and unlicensed bands
  - Organizations and Institutions
  - Technical and economic aspects

SESSION 16
Wireless technologies
  - WPAN
  - WLAN
  - WMAN
  - WWAN and Mobile telephony

SESSIONS 17 - 18
IEEE 802.11 protocol
  - Standards evolution
  - Multiprotocol devices
  - Throughput
  - Medium Access Control
  - Frames
  - CSMA/CA vs. CSMA/CD
  - Components
  - Topologies

Practical exercises

SESSION 19
Antennas
  - Key concepts
  - Features
  - Examples
  - SNR and RSSI

SESSION 20
Roaming
  - Key concepts
  - Features
  - Examples
  - SNR and RSSI

SESSIONS 21 - 22
SESSION 23
Telephony Over IP: an example on how to implement an Information Systems infrastructure
- VoIP Implications
- The human voice: production and adaptation
- Voice communication
- Signalling

SESSION 24
The IP Network
- Protocols
- Encapsulation

SESSIONS 25 - 26
Signalling protocols and QoS (Quality Of Service)
- H323, H225, SIP
- MGCP
- MPLS
- IP convergence and VoIP applications

SESSIONS 27 - 29
Digital business technology platforms: a systems infrastructure perspective
- Digital platforms
- Information systems platform
- Customer experience platform
- Data and analytics
- IoT
- Ecosystems platform

SESSION 30
FINAL PROJECT PRESENTATIONS
Details for the Final Project will be arranged at the start of the course. Details on tests and assignments will be also provided during the course according to the content explained.
BIBLIOGRAPHY

Each session will provide specific links to online resources and some articles on the basis of systems infrastructure.

Additional materials may also be distributed and referenced as the course progresses, as long as they are ordered in advance.

The followings books are recommended for this course:

RECOMMENDED

Title: The Architecture of Computer Hardware, Systems Software, and Networking: An Information Technology Approach
Author: Irv Englander
Publisher / Edition / Year: Wiley / 5th / 2014
Medium: PRINT

Title: Internetworking with TCP/IP
Author: Douglas E. Comer
Publisher / Edition / Year: Pearson Education Limited / 2013
ASIN: B00LKKVW2O
Medium: PRINT

Title: Computer Networks And Internets
Author: Douglas E. Comer
Publisher / Edition / Year: Pearson India / 6th / 2017
Medium: PRINT

Author: David A. Patterson, John L. Hennessy
Publisher / Edition / Year: Morgan Kaufmann / 5th / 2017
Medium: PRINT

Title: IT Essentials Companion Guide v6 (6th Edition)
Author: Cisco Networking Academy
Publisher / Edition / Year: Cisco Press / 6th / 2016
Medium: PRINT
EVALUATION CRITERIA

This course requires students to attend, at least, to the 70% of the sessions. You will be asked to make written and verbal presentations and take an active role in class discussions. The evaluation is based on the following criteria:

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Percentage</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intermediate Tests</td>
<td>30%</td>
<td></td>
</tr>
<tr>
<td>Group Presentation</td>
<td>30%</td>
<td></td>
</tr>
<tr>
<td>Individual Work</td>
<td>25%</td>
<td></td>
</tr>
<tr>
<td>Class Participation</td>
<td>15%</td>
<td></td>
</tr>
</tbody>
</table>

A. Class participation

Students must attend, at least, 70% of all classes and participate in class discussions. The rating of the class participation is based on two aspects, the presence and contributions to class discussions. Contributions on class discussions will focus on quality, not quantity of the contribution, so that students who participate often do not necessarily receive a better rating than those who participate less frequently. Therefore, students are encouraged to start contributing to the discussions since the beginning of the course.

For this course, consider the cases and the documentation just a starting point. Feel free to update, add additional data or analysis to the discussion, or ask questions in the light of recent news or the news the read.

B. GROUP CASE AND INDIVIDUAL WORK

For each individual write-up, there is an upper limit of three pages of text (assuming 11-point font size, Times New Roman, double spacing) plus no more than one page of exhibits.

A hard copy of the document must be delivered to the professor in class. You also have to upload a soft copy of the case write-up to the professor via Campus Online.

Make sure the case write-up is easy to read. Consider using bullets, headings, etc., to make the case write-up easy to follow.

The objective of this process it to give you practice writing concise executive summaries – something that would make the reader believe that you have done a thorough analysis supporting your recommendations. This is the type of briefing that must typically be prepared for upper management – before they provide the resources for a more detailed investigation.
Good case briefs are concise, but also provide a fact-based rationale for your recommendations and implementation plan. The rationale should reflect a good understanding of the important issues of the case and may integrate previous material from the class or your experience. You might also note factors that argue against your recommendation, and how your implementation plan might minimize the impact of these factors.

C. FINAL GROUP PRESENTATION AND REPORT

You are also expected to complete a final project with your group and present it in written form. The project will give you the opportunity to reflect on what you have learnt in class and apply it to some practical problems. More details of the project will be provided by the start of the course.

D. TESTS

Texts will focus on the topics explained throughout the course. Detailed instructions will be provided during the course.

RE-SIT / RE-TAKE POLICY

Each student has 4 chances to pass any given course distributed over two consecutive academic years: ordinary call exams and extraordinary call exams (re-sits) in June/July.

Students who do not comply with the 70% attendance rule during the semester will fail both calls for this Academic Year (ordinary and extraordinary) and have to re-take the course (i.e., re-enroll) in the next Academic Year.

Evaluation criteria will be subject to the following rules:

Students failing the course in the ordinary call (during the semester) will have to re-sit the exam in June / July (except those not complying with the attendance rule, who will not have that opportunity and must directly re-enroll in the course on the next Academic Year).

The extraordinary call exams in June / July (re-sits) require your physical presence at the campus you are enrolled in (Segovia or Madrid). There is no possibility to change the date, location or format of any exam, under any circumstances. Dates and location of the June / July re-sit exams will be posted in advance. Please take this into consideration when planning your summer.

The June / July re-sit exam will consist of a comprehensive exam. Your final grade for the course will depend on the performance in this exam only; continuous evaluation over the semester will not be taken into consideration. Students will have to achieve the minimum passing grade of 5 and can obtain a maximum grade of 8.0 (out of 10.0) – i.e., “notable” in the in the re-sit exam.

Retakers: Students who failed the subject on a previous Academic Year and are now re-enrolled as re-takers in a course will be needed to check the syllabus of the assigned professor, as well as contact the professor individually, regarding the specific evaluation criteria for them as retakers in the course during that semester (ordinary call of that Academic Year). The maximum grade that may be obtained in the retake exam (3rd call) is 10.0.

After ordinary and extraordinary call exams are graded by the professor, you will have a possibility to attend a review session for that exam and course grade. Please be available to attend the session in order to clarify any concerns you might have regarding your exam. Your professor will inform you about the time and place of the review session.

Students failing more than 18 ECTS credits after the June-July re-sits will be asked to leave the Program. Please, make sure to prepare yourself well for the exams in order to pass your failed subjects.

In case you decide to skip the opportunity to re-sit for an exam during the June / July extraordinary call, you will need to enroll in that course again for the next Academic Year as a re-taker and pay the corresponding extra cost. As you know, students have a total of 4 allowed calls to pass a given subject or course, in order to remain in the program.

PROFESSOR BIO

Professor: MARIANO ALVAREZ DIENTE
E-mail: mad2@faculty.ie.edu

Academic Background
- Graduate and Master in Telecommunication Engineer, Universidad de Valladolid
- Graduate and Master in Literary Theory and Comparative Literature, Universidad de Valladolid.
- Master in E.S.O, Bachillerato, Professional training and languages teaching.
- Master in Philological studies: professional/business applications.
- Candidate Doctor of Philosophy (Ph. D). Discourse Analysis on Smart Cities. Expected 2019

Complementary Background

Academic experience
- Colegio San José. Valladolid.
- Currently, Instructor at IBM Global Services on Internetworking and Information and Telecommunication Technologies. Since 2004

Courses taught at IBM Global Services:
- Big Data & Analytics
- Mobile & corporate strategy
- Internet of Things using Bluemix
- New technologies in communications
- WLAN networks implementation
- WLAN security
- WiMAX technology
- TCP/IP fundamentals
- Networks Implementation & administration
- IP Telephony (VoIP).

OTHER INFORMATION
OFFICE HOURS - CONTACT INFORMATION
Office hours: Live tutorials available by previous appointment.
Contact details: e-mail: mad2@faculty.ie.edu

CODE OF CONDUCT IN CLASS
1. Be on time: Students arriving more than 5 minutes late will be marked as “Absent”. Only students that notify in advance in writing that they will be late for a specific session may be granted an exception (at the discretion of the professor).
2. **If applicable, bring your name card and strictly follow the seating chart.** It helps faculty members and fellow students learn your names.

3. **Do not leave the room during the lecture:** Students are not allowed to leave the room during lectures. If a student leaves the room during lectures, he/she will not be allowed to re-enter and, therefore, will be marked as “Absent”.

Only students that notify that they have a special reason to leave the session early will be granted an exception (at the discretion of the professor).

4. **Do not engage in side conversation.** As a sign of respect toward the person presenting the lecture (the teacher as well as fellow students), side conversations are not allowed. If you have a question, raise your hand and ask it. If you do not want to ask it during the lecture, feel free to approach your teacher after class.

If a student is disrupting the flow of the lecture, he/she will be asked to leave the classroom and, consequently, will be marked as “Absent”.

5. **Use your laptop for course-related purposes only.** The use of laptops during lectures must be authorized by the professor. The use of Social Media or accessing any type of content not related to the lecture is penalized. The student will be asked to leave the room and, consequently, will be marked as “Absent”.

6. **No cellular phones:** IE University implements a “Phone-free Classroom” policy and, therefore, the use of phones, tablets, etc. is forbidden inside the classroom. Failing to abide by this rule entails expulsion from the room and will be counted as one absence.

7. **Escalation policy: 1/3/5.** Items 4, 5, and 6 above entail expulsion from the classroom and the consequent marking of the student as “Absent.” IE University implements an “escalation policy”: The first time a student is asked to leave the room for disciplinary reasons (as per items 4, 5, and 6 above), the student will incur one absence, the second time it will count as three absences, and from the third time onward, any expulsion from the classroom due to disciplinary issues will entail 5 absences.