FACULTAD DE CIENCIAS FÍSICAS Y MATEMÁTICAS UNIVERSIDAD DE CHILE

PROGRAMA DE CURSO

Código	Nombre			
EL7048	Tópicos en Tecnologias de Comunicaciones e Información Green			
Green Information and Communication Technologies				
SCT	Unidades Docentes	Horas de Cátedra	Horas Docencia Auxiliar	Horas de Trabajo Personal
6	10	3.5	1.5	5.0
Requisitos			Carácter del Curso	
EL4005 Principles of Communications/authorizations[1,2]			Electivo de la Linea Electivo de Postgrado	
Resultados de Aprendizaje				
At the end of the course, the student will ● Understand and use relevant topics, categories, issues, technologies and solutions on the environmental sustainability relevant to information and communication technologies (ICT) systems. ● Analyze and evaluate the sustainability and green issues in ICT as well as approaches relevant to ICT systems ● Develop and compare some new green principles, strategies and approaches ● Evaluate the roles of relevant advanced green ICT technologies and approaches				

Metodología Docente	Evaluación General
The course will use the following teaching methods: ● Lectures ● Invited talks by expert speakers in relevant topics ● Activities in the classroom ● Assignments, in which the students present papers and articles in the relevant areas of green research. ● Projects ● Discussion of papers. In terms of organization, the course has three thematic units that will be covered in the first 10 weeks of the course. The last 4 weeks will be exclusively devoted to work on a research topic integrating and	The students will be evaluated based on the following criteria: ● Exercises ● Assignments of research papers and articles in which they will present their interpretation ● Research Project

[1] EE Students who have taken EL4001 Energy Conversion and Power Systems, EL4002 Digital Systems, EL4102 Computer Architecture, EL4103 Energy Systems and Electrical Equipment or EL4107 Information and Communication Technologies may also take this course. Please ask the instructor for authorization.

[2] Students from other Departments are also allowed to take the course if with relevant backgrounds, such as: Computer Science (CC4301 Computer Architecture, CC4303 Networks), Industrial Engineering (IN4402 Probability and Statistics Applications Management, IN4703 Operation Management I, IN4704 Operation Management II) Environmental Civil engineering (CL4102 Environmental Engineering, CI5106 Water Treatment Processes).

consolidating what has been learned in the previous 3 units of the course. The projects should have been prepared since the third week of the course.	

Unidades Temáticas

Número	Nombre de la Unidad	Duración en Semanas
1	Introduction and Concepts of Green ICT	2

Contenidos	Resultado de Aprendizaje de la Unidad	Referencias a la Bibliografía
• Green ICT definitions and Global ICT footprint • Major categories of green ICT and relevant techniques • Relevant social science aspects and frameworks • Case study	At the end of this unit, the students will: • Understand the meaning and importance of ICT environmental sustainability • Analyze major categories of green ICT • Explain and use basic metrics of green ICT	[1][2][4]

Número	Nombre de la Unidad	Duración en Semanas
2	Green ICT issues, technologies, and approaches	5

Contenidos	Resultado de Aprendizaje de la Unidad	Referencias a la Bibliografía
• Key sustainability issues across the organization in business processes • Key green issues, approaches, and applications of ICT systems, such as green data centers, green computing systems, smart buildings, smart energy management, sustainable cities • Key green issues and approaches across communications and networking, such as green physical layer techniques, green wireless networks, green wireline networks, energy harvesting, green smart grid communications • Case studies, such as advanced cooling technologies, optimizing physical placement of the	At the end of this unit, the students will: • Recognize , understand manage the relevant green issues of ICT infrastructures and systems. • Explain the importance and role of renewable energy systems • Understand and evaluate green issues on communications and networking systems • Evaluate the roles of relevant advanced green ICT technologies and approaches, such as cooling, power management techniques • Analyze and compare the relevant green issues and approaches • Develop and compare some new green principles, strategies and approaches	[1-6]

resources, integration techniques, power management, virtualization techniques		

Número	Nombre de la Unidad	Duración en Semanas
3	Environmental assessment and sustainability	3

Contenidos	Resultado de Aprendizaje de la Unidad	Referencias a la Bibliografía
• Introduction of the Life cycle assessment (LCA) concept, and the life cycle stages. • LCA model • Principles of life cycle design and variants of life cycle assessment. • Recyclability strategy and methodologies • Sustainable methods of end of life management • Waste management approaches. • Applications, economics, social issues, and interdisciplinary topics	At the end of this unit, the students will: • Formulate environmental assessment issues based on the concept of LCA • Use some principles and approaches of recycling • Analyze interdisciplinary green issues • Use some waste management principles to analyze relevant approaches	[2][5][6]

Bibliografía

Basic Bibliography

[1] J. Wu, S. Rangan, H. Zhang, "Green communications: theoretical fundamentals, algorithms, and applications," CRC Press, USA, Sept. 2012

[2] S. Murugesan and G. R. Gangadharan, Harnessing Green IT: Principles and Practices, Wiley, October 2012

Complementary bibliography

[3] J. Wu, "Green wireless communications: from concept to reality," IEEE Wireless Communications, vol. 19, no. 4,, August. 2012

[4] J. Wu, J. Thompson, H. Zhang, Daniel C. Kilper, "Green communications and computing networks", IEEE Communications Magazine, vol. 52, no. 11, Nov. 2014

[5] IEEE Digital Library, available at http://ieeexplore.ieee.org/Xplore/home.jsp

[6] ACM Digital Library, available at http://dl.acm.org/

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