Wireless Communications

1. **Course number and name:** 020CSFES3 Wireless Communications

2. **Credits and contact hours:** 4 ECTS credits, 2x1:15 contact hours

3. **Instructor's or course coordinator's name:** Melhem El Helou

4. **Text book:**
   a. **Other supplemental materials:**
      Course handouts; standards and white papers; lab experiments

5. **Specific course information**
   a. **Catalog description:**
      This course covers the fundamentals of wireless communications (with emphasis on wireless channel modeling); digital modulation in wireless channels; channel coding and interleaving in fading channels; equalization; diversity; multiple antenna systems; spread spectrum; multicarrier modulation; multiple access; WiFi networks; cellular basics and concepts; cellular functions in mobile networks.

   b. **Prerequisites:**

   c. **Required:** Elective for CCE students; required for CCE telecommunication networks option students

6. **Specific goals for the course**
   a. **Specific outcomes of instruction:**
      Analyze the fundamentals of wireless communications.
      Model, simulate and analyze wireless communication systems.
      Compute and interpret radio link budgets.
      Design OFDM multi-carrier transmission systems.
      Analyze and plan WiFi networks.
      Understand cellular concepts and functions in mobile networks.

   b. **KPI addressed by the course:**

KPI	a1	a2	c1	c2	e1	e2	e3	k2	k3
Covered		x	x	x	x	x	x		x
Assessed	x	x	x	x	x	x	x	x	x
Give Feedback									

7. **Topics and approximate lecture hours:**
   Overview of wireless communications: context and motivations, technical challenges, wireless services, wireless spectrum (2 lectures)
   Radio propagation and channel modeling (pathloss, fast/slow shadowing); wireless channel selectivity (4 lectures)

Radio link budget (2 lectures)
Performance of digital modulation over wireless channels; capacity of wireless channels (2 lectures)
Channel coding and interleaving for fading channels (2 lectures)
Equalization; diversity techniques (1 lecture)
Multiple antenna systems; spread spectrum (2 lectures)
Multicarrier modulation; design of OFDM systems (3 lectures)
Activity on simulating and analyzing wireless communication systems using Matlab (1 lecture)
Multiple access (2 lectures)
WiFi networks (3 lectures)
Activity on planning and installing WiFi networks (2 lectures)
Cellular concepts and functions (2 lectures)