Syrian Arab Republic		**الجمهورية العربية السورية**
Ministry of Higher Education		**وزارة التعليم العالـــي**
Syrian Virtual University		**الجامعة الافتراضية السورية**

Mobile and Wireless Communications Course Definition Form

1- Basic Information:

Course Name	Mobile and Wireless Communications
Course ID	CCS402
Contact Hours (Registered Sessions)	30
Contact Hours (Synchronized Sessions)	18
Mid Term Exam	There is not
Exam	1.5
Registered Sessions Work Load	30
Synchronized Session Work Load	18
Credit Hours	5

2- Pre-Requisites:

Course	**ID**
Electromagnetic Waves and Transmission Lines	CRF301

3- Course General Objectives:

This course aims to enable the student to identify the types of fading that exist within a wireless channel, and thus, to find the appropriate channel model to be used in order to study the system performance and to determine system parameters that ensures best reliability and availability of the whole system. Also, the course aims to give the student with the required knowledge to be able to identify the system capacity and limits; using this knowledge, the student should be able to characterize the wireless channel and so find the best conditions that causes the best performance using the available resources. On the other hand, upon finishing this course, the student will be able to suggest the best solution for each impairment in the communication channel.

4- Intended Learning Outcomes (ILO):

Code	Intended Learning Outcomes
ILO1	Radio spectrum utilization
ILO2	Fading and wireless channel properties
ILO3	Wireless channel modeling
ILO4	Diversity and MIMO systems
ILO5	Improving wireless systems performance
ILO6	Wireless systems planning and analysis

5- Course Syllabus (18 hours of total synchronized sessions)

- **RS:** Recorded Sessions**; SS:** Synchronized Sessions**;**

ILO	Course Syllabus	RS	SS	Type	Additional Notes
ILO1 ILO6	**Introduction to wireless communication systems:** • Overview • Current wireless systems • Radio spectrum	3	1.5	☒ Exercises ☒ Assignments ☐ Seminars ☐ Projects ☐ Practices ☐ Others	
IOL2 ILO5	**Fading:** • Causes and types • Effects • Solutions	6	3	☒ Exercises ☒ Assignments ☐ Seminars ☐ Projects ☐ Practices ☐ Others	One lab assignment: Flat and frequency selective fading
ILO2 ILO3	**Path loss and shadowing:** • Radio propagation models • Ray tracing models • Empirical path loss models • Shadowing • Outage probability and coverage area	6	3	☒ Exercises ☒ Assignments ☐ Seminars ☐ Projects ☐ Practices ☐ Others	One lab assignment: Shadowing effects on system performance
ILO2		6	3	☒ Exercises	One lab assignment:

ILO3 ILO6	**Statistical multipath channel models:** • Rayleigh fading model • Rice fading model • Other fading models • Doppler fading			☒ Assignments ☐ Seminars ☐ Projects ☐ Practices ☒ Others	Rayleigh and Rice fading
ILO6	**Wireless channel capacity:** • Capacity in AWGN channels • Capacity in flat fading channels • Capacity in frequency-selective fading channels	3	1.5	☒ Exercises ☒ Assignments ☐ Seminars ☐ Projects ☐ Practices ☒ Others	Practical problems on system design
ILO4 ILO5 ILO6	**Improving the performance of wireless systems:** • Diversity • MIMO systems	6	6	☒ Exercises ☒ Assignments ☐ Seminars ☐ Projects ☐ Practices ☒ Others	2 labs assignments: 1) The effect of using OSTBC on the system performance 2) The effect of diversity on system performance

6- Assessment Criteria (Related to ILOs)

ISC	Interactive Synchronized Collaboration		Ex	Exams		Rpt	Reports
PF2F	Presentations and Face-to-Face Assessments		PW	Practice Work			

ILO Code	ILO	Intended Results	Assessment Type				
			ISC	PW	Ex	PF2F	Rpt
ILO1	Radio spectrum utilization	**10%**	Yes		Yes		Yes
ILO2	Fading and wireless channel properties	30%	Yes		Yes		Yes

ILO3	Wireless channel modeling	30%	Yes		Yes		Yes
ILO4	Diversity and MIMO systems	10%	Yes		Yes		Yes
ILO5	Improving wireless systems performance	10%	Yes		Yes		Yes
ILO6	Wireless systems planning and analysis	10%	Yes		Yes		Yes

7- Practice Tools:

Tool Name	Description
MATLAB	Software to be used in simulating different channel models and impairments

8- Main References

- Goldsmith, "Wireless Communications." New York, NY: Cambridge University Press, 2005
- David Tse, Pramod Viswanath, "Fundamentals of Wireless Communication", Cambridge University Press, 2005.
- F. Perez Fontan, P. Marino Espineira, "Modeling the wireless propagation channel", Wiley, 2008

9- Additional References

- Marvin K.Simon and Mohamed-Slim Alouini, Digital Communication over Fading Channels, 2nd ed. John Willy & Sons, 2005
- Ian Glover, Peter Grant, "Digital Communications", Prentice Hall, 2000
- John S. Seybold, "Introduction to RF Propagation", John Wiley & Sons, Inc., 2005.