**University of Tehran**
**School of Electrical and Computer Engineering**

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| **Course:** | **Cellular Networks** |
| **Course type:** | <table><tr><td></td><td colspan="6">EE*</td><td colspan="3">CE*</td><td rowspan="2">Credit: 3</td></tr><tr><td></td><td>Com</td><td>E</td><td>P</td><td>B</td><td>Con</td><td>D</td><td>SW</td><td>HW</td><td>IT</td></tr><tr><td>Required</td><td>☒</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td></tr><tr><td>Elective</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td></tr></table> |
| **Level:** | Undergraduate ☐<br>Graduate ■ |
| **Co-requisite(s):** | None |
| **Prerequisite(s):** | Computer Networks |
| **Prerequisite by topic:** | general knowledge on computer and communication networks |
| **Textbook(s):** | [1] Stefania Sesia, Issam Toufik, Matthew Baker, "LTE, The UMTS Long Term Evolution: From Theory to Practice," John Wiley & Sons Ltd, 2011.<br>[2] Erik Dahlman, Stefan Parkvall, Johan Skold, Per beming, "3G Evolution: HSPA and LTE for Mobile Broadband," Academic Press, Elsevier, 2nd Edition, 2008.<br>[3] Pierre Lescuyer, Thierry Lucidarme, "Evolved Packet System, The LTE and SAE Evolution of 3G UMTS," John Wiley & Sons Ltd, 2011.<br>[4] Ajay R Mishra, "Advanced Cellular Network Planning and Optimisation," John Wiley & Sons Ltd, 2007. |
| **Coordinator:** | Vahid Shah-Mansouri |
| **Goals:** | This course is designed for graduate students in communication systems and communication networks. The goal of this course is to provide students with basic knowledge in cellular communication technologies including 2G, 3G, and 4G, and 5G networks. The focus of this course is on the core network rather than the physical layer. Besides general knowledge of cellular technologies, in this course, student will study in details the resource management techniques and will become familiar with various services/applications provided in these systems. |
| **Outcome:** | After taking this course, the students are expected to<br>1. A quick glance at the SS7.<br>2. Become familiar with the core function of GSM, GPRS, and UMTS technologies.<br>3. Become familiar with handover in cellular networks and mobility models.<br>4. Acquire deep knowledge in evolved packet core of 4G systesm |

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| | 5. Become familiar with 5G cutting edge technology . |
| **Topics:** | GSM, GPRS, and EDGE networks<br>2G circuit switching structure<br>2G/3G core networks<br><br>3G Networks (UMTS and HSPA)<br>UTRAN Air interface<br>Core Network<br><br>Handover and mobility models<br><br>4G Networks<br>Evolved UTRAN<br>Evolved Packet Core Network<br><br>5G Technologies<br>Design overview<br>SDN technology<br>NFV technology |
| **Computer usage:** | none |
| **Assignments:** | Written homeworks and paper readings |
| **Projects:** | term project |
| **Grading:** | 1 Mid Term (30%), 1 Final (35%), Term project (20%)<br>HW assignments (15%) |
| **Further readings:** | 1. D. P. Agrawal and Q.-A. Zeng, "Introduction to Wireless and Mobile Systems," Cengage learning, 3rd edition, 2011.<br>2. J. Laiho, A. Wacker, T. Novosad, "Radio Network Planning and Optimisation for UMTS," John Wiley & Sons, 2006. |
| **Prepared by:** | Vahid Shah-Mansouri |
| **Date:** | Aug 24, 2017 |

| *EE: Electrical Engineering | | CE: Computer Engineering | |
|---|---|---|---|
| Com | Communications | SW | Software |
| E | Electronics | HW | Hardware |
| P | Power | IT | Information Technology |
| B | Bioelectronics | | |
| Con | Control | | |
| D | Digital System | | |