



WIRELESS COMMUNICATION FOR BODY IMPLANTED DEVICE

Dr. Kamyaz Yazdandoost

January 13-15, 2014

Lectures:

Mon. 13th: 8:30-10:00, 10:30-12:00

Tue. 14th: 8:30-10:00, 10:30-12:00,

Wed. 15th: 8-30-10:00, 10:30-12:00 (Question, Problem and Homework)

Venue: To be defined

Exam: Date to be defined during lectures

Credit units: To be defined

Wireless technology and its role in society is evolving dramatically. Smarter technologies and connected devices are opening up new horizons in so many applications with own challenges such as medical field and health care. The wireless medical implanted device creates many new possibilities and has the potential to responses to medical challenges. It is expected that ever sophisticated medical devices will be implanted inside the human body for medical telemetry and telemedicine.

This course provides an inclusive coverage on the subject of implanted medical wireless communication systems. To set up effective and efficient wireless links for implanted devices, it is essential to give special attention to the antenna design and channel modeling. Therefore, deep knowledge of the RF field and biological tissues will be required.

Course Contents:

1. Background and Overview of Body Implanted Device
2. Implant Device Communication Methods
3. Medical Implant Communication Standards
4. Medical Implant communication Design Requirements
5. Wave Propagation in the Biological Materials
6. RF Radiation Safety and Thermal Effects
7. Body Implanted Antenna
8. Channel Modeling for Body Implanted Devices

Conduction:

Class work & Homework (30%), and Written Exam (70%).

Literature:

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- [3] O. P. Gandhi, "Biological Effects and Medical Applications of Electromagnetic Energy," Prentice Hall, 1990.
- [4] D. Prutchi, M. Norris, Design and Development of Medical Electronic Instrumentation: A Practical Perspective of the Design, Construction, and Test of Medical Devices, Wiley, 2004.
- [5] Arie Reichman, Jun-ichi Takada, Dragana Bajic, K. Yekeh Yazdandoost, Wout Joseph, Luc Martens, Christophe Roblin, Raffaele D'Errico, Carala Oliveira, Luis M. Correia, and Matti Hamalainen, "Body Communications", pp.609-660, in "Pervasive Mobile and Ambient Wireless Communications", Springer 2012.
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- [12] Alomainy, A., Hao, Y.: *Modeling and Characterization of Biotelemetric Radio Channel from Ingested Implants Considering Organ Contents*. *IEEE Transactions on Antennas and Propagation* 57, pp. 999–1005 (2009)
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- [16] W. G. Scanlon, J. B. Burns & N. E. Evans, "Radio Wave Propagation from a Tissue-Implanted Source at 418 MHz and 916.5 MHz," *IEEE Trans. Biomedical Engineering*, vol. 47, 4, pp. 527–534, 2000.
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- [20] FCC, *Medical implant communications*, January 2003, http://wireless.fcc.gov/services/index.htm?job=service_home&id=medical_implant
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