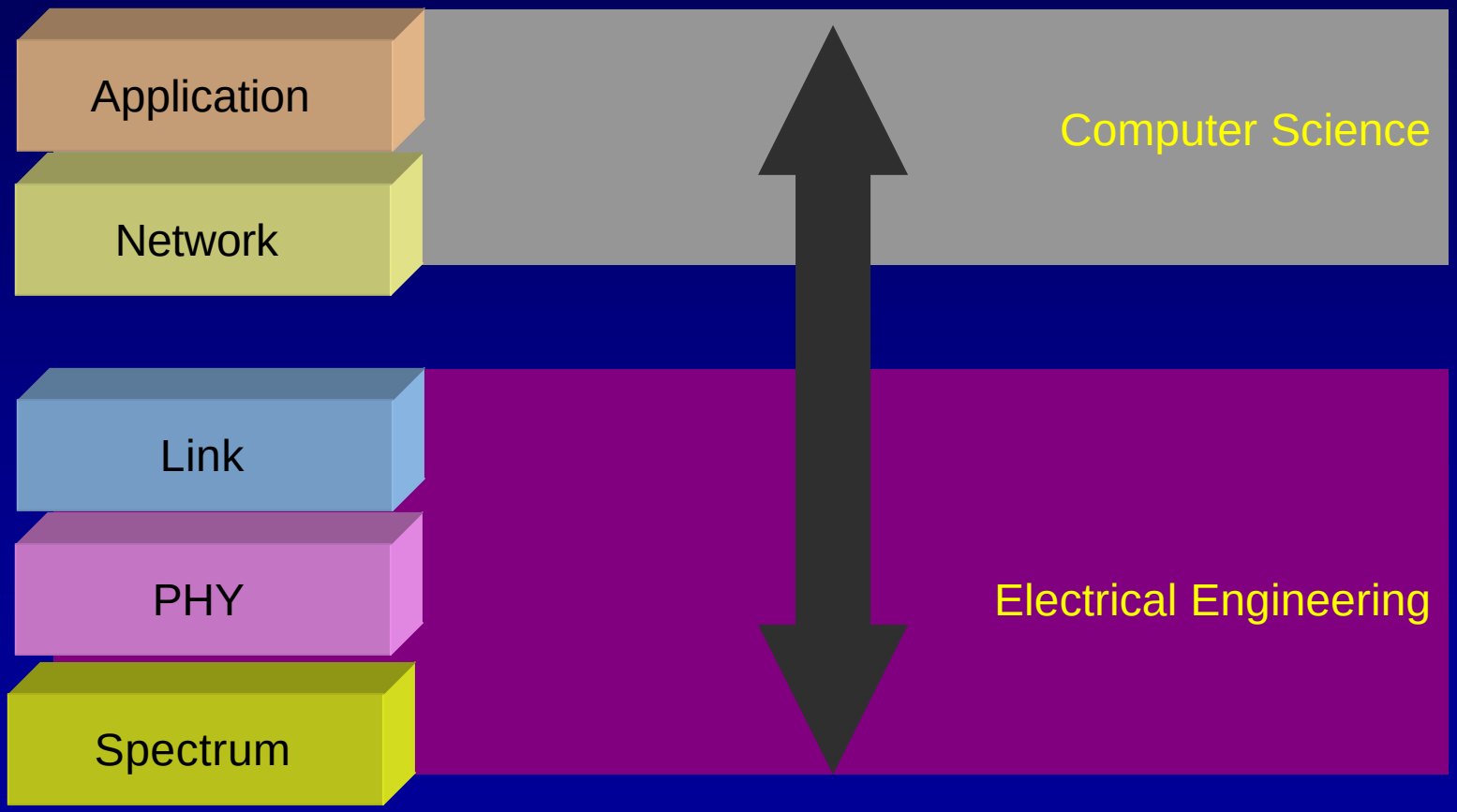
Wireless Systems Instructional Design

What is this course about?



Course Outline

- Foundation
  - Introduction to wireless communication
  - RF signal propagation & Measurements
  - Overview of modulation techniques & PHY
  - Multiple Access Techniques
  - Network Layer Protocols
  - Application Layer Issues
  - PHY, MAC & Networks layer Simulation and Protocol Design
- Case studies
  - IEEE 802.11
  - Adhoc & Sensor Networks
- Lecturers

Lecture & Project Details

- Weekly Outline
  - Lecture 1: Overview & Introduction to propagation & PHY
  - Lecture 2: PHY and RF signal propagation & Measurements Project
  - Lecture 3: PHY Simulations of Communication Systems: Principles & Methodology
  - Lecture 4: Introduction to Multiple Access Techniques and Project Description
  - Lecture 5: Introduction to Network Layer Protocols and Project Description
  - Lecture 6: MAC & Network Simulations of Wireless Systems: Principles & Methodology
  - Lecture 7: Application Layer Issues and Project Description
  - Lecture 8: Interactions of PHY, MAC & Network layer Simulation and Protocol Design
  - Lectures 9++ : Devoted to Project Work related discussion
- Tools & Packages
  - Spectraplan, SPW, ns2

References

- Wireless Communications:Theodore S. Rappaport, *Prentice Hall Communications Engineering and Emerging Technologies Series.*
- IEEE 802.11 standards specification.

Course Grading & Project Format

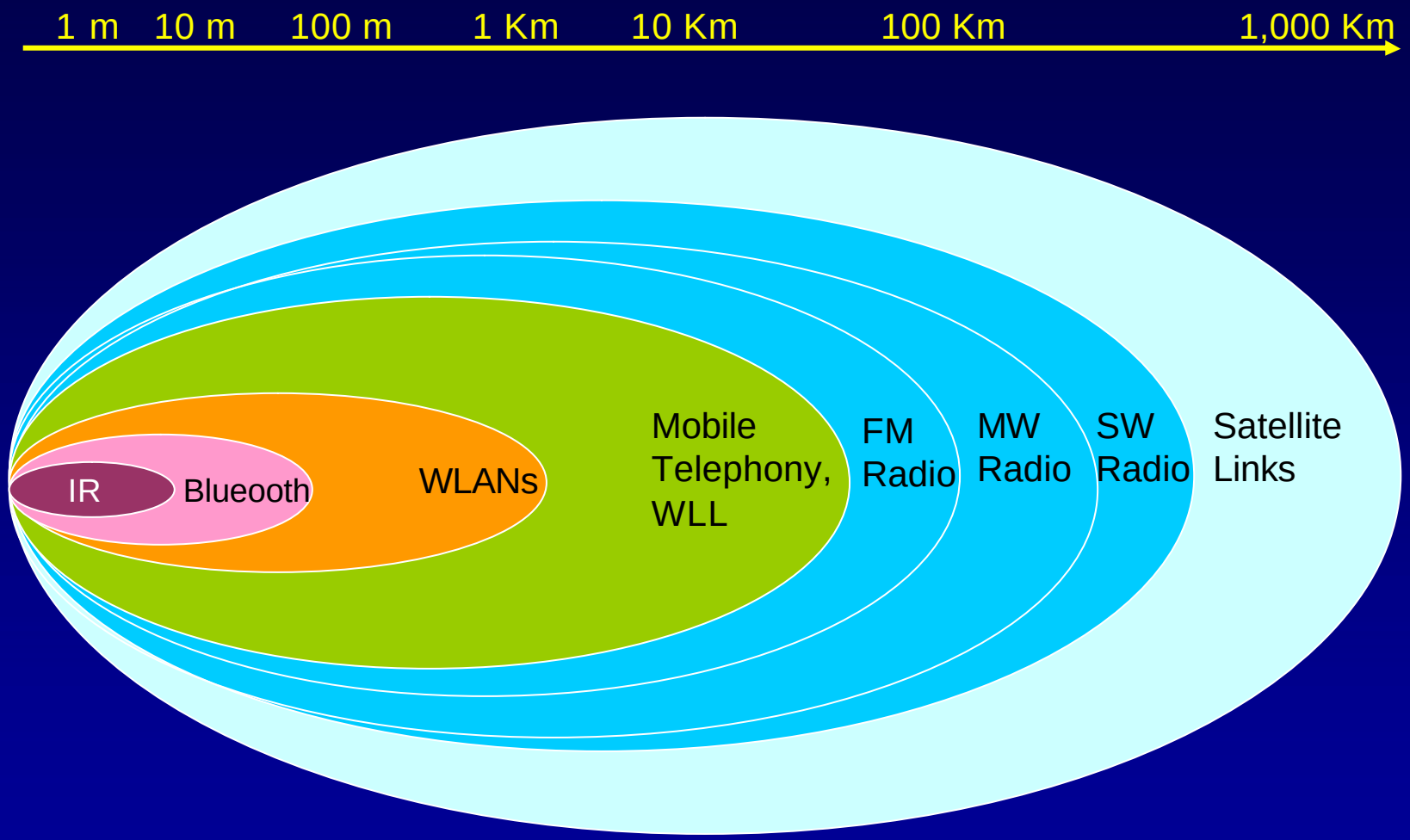
- Project Work & Presentation - 70%
- Project Related Oral Exam ☺ - 30%

- Project Format
  - Each student will do a total of either 2 or 3 team projects from PHY/MAC/Network/Application Layers
  - Teams will be formed based on class break-up among ECE and CS students

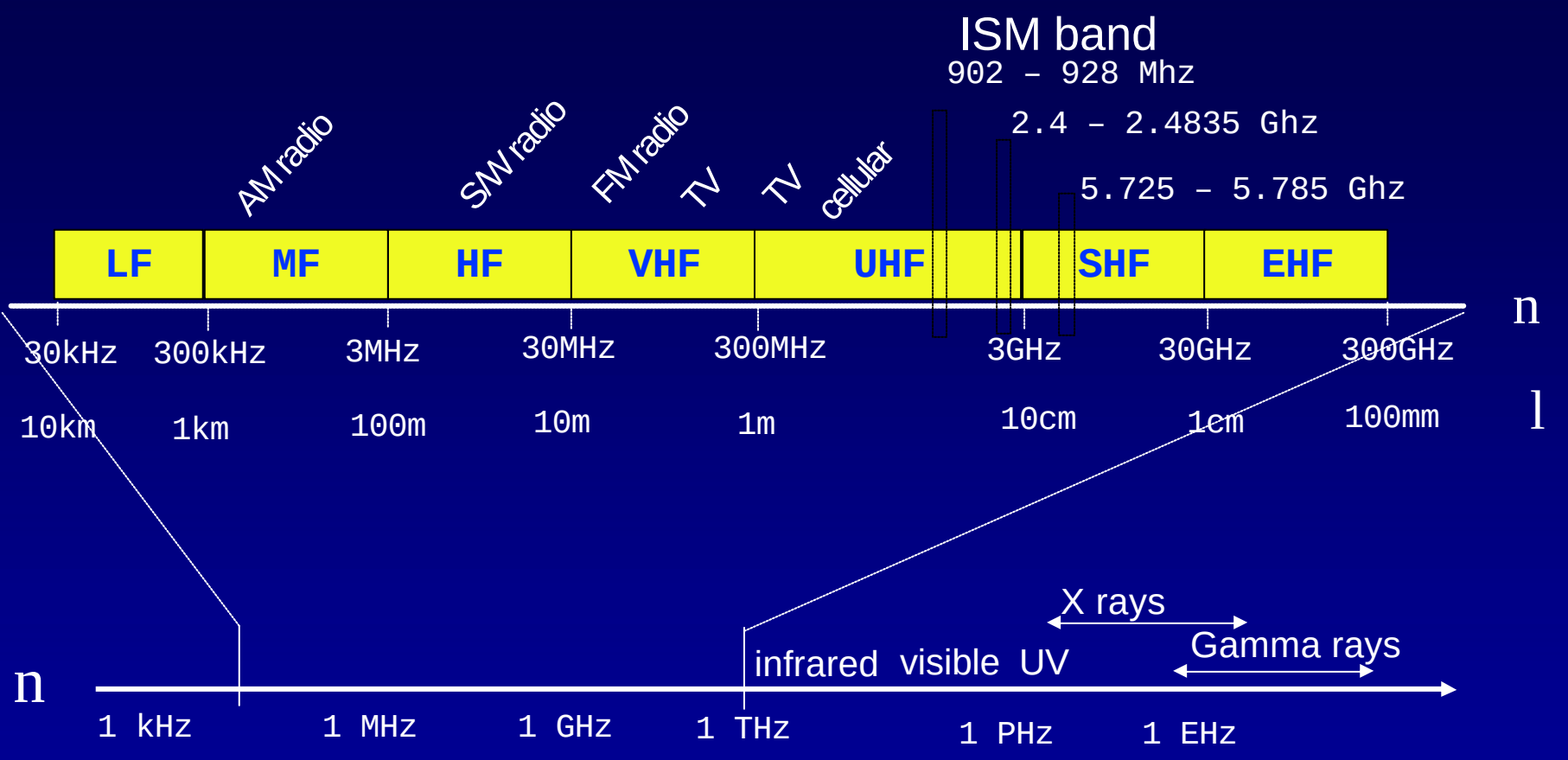
Wireless Systems: Examples

AM, FM Radio TV Broadcast Satellite Broadcast	Broadcast (analog)
2-way Radios Cordless Phones	2-way communication (analog)
Satellite Links Mobile Telephony Systems Wireless Local Loop (WLL) Microwave Links Wireless LANs Infrared LANs	2-way communication (digital)

Wireless Systems: Range Comparison



EM Spectrum



Propagation characteristics are different in each frequency band

Rest of this lecture

- Overview of Radio Propagation
- Overview of Digital Communication Systems with emphasis on PHY