Visible Light Communications, Networking, and Applications
Spring, 2020
Lecture: on T R, 8:00 – 9:15

Instructor: Sihua Shao
Office: Workman 209
Phone: (575)835-5932
E-mail: sihua.shao@nmt.edu
Office Hours: TBD

Course Description: Visible light communication (VLC) utilizes license-free visible light spectrum to achieve Gb/s data rate with MIMO, achieves centimeter-level location accuracy with dominant line-of-sight signals, secures the channel with small coverage, and operates harmlessly in radio-sensitive environments. This course will cover the principles and applications of VLC. Topics include: sources and detectors, channel modeling, modulation schemes, dimming control, indoor positioning system, heterogeneous radio-optical networks, and diverse applications.

Pre-requisites: *EE 311 (Signals and Systems)*

Place in Curriculum: This course is an Engineering Elective course.

Course Learning Outcomes:
After completion of this course, students are expected to be able to:

- Identify the features of different sources and detectors
- Identify the characteristics of the VLC channel under different settings
- Analyze the performance of different VLC modulation schemes
- Understand the constraints imposed on a VLC system by illumination requirement
- Analyze the location accuracy of different types of visible light positioning system
- Analyze the system capacity of heterogeneous radio-optical networks
- Identify the superiorities and challenges of VLC in diverse applications
- Analyze the system performance through MATLAB based simulation

Program Learning Outcomes: https://www.nmt.edu/academics/eleceng/undergrad/index.php

Textbook and References:
Textbook: *Zabih Ghassemlooy, Wasiu O. Popoola and Sujan Rajbhandari, Optical Wireless Communications: System and Channel Modelling with MATLAB, Second Edition, CRC Press, 2019*
References (not required):
1) Zabih Ghassemlooy, Luis Nero Alves, Stanislav Zvanovec and Mohammad-Ali Khalighi, Visible Light Communications: Theory and Applications, CRC Press, 2017
2) Murat Uysal, Carlo Capsoni, Zabih Ghassemlooy, Anthony C. Boucouvalas and Eszter Udvary, Optical Wireless Communications: An Emerging Technology, Springer, 2016
3) Nan Chi, LED-Based Visible Light Communications, Springer, 2018
4) Shlomi Armon, Visible Light Communication, Cambridge University Press, 2015

Grading:

- Midterm: 20%
- Final term: 30%
- Projects: 50%

A	90-100	C	70-72
A-	86-89	C-	66-69
B+	83-85	D+	63-65
B	80-82	D	60-62
B-	76-79	F	<60
C+	73-75		

There will be no make-up exams or quizzes except in the case of extraordinary circumstances. Students may work together on projects but must turn in the individual reports that CANNOT BE IDENTICAL.

Academic Honesty: New Mexico Tech's Academic Honesty Policy for undergraduate and graduate students is found in the student handbook, which can be found at: http://www.nmt.edu/student-handbook. You are responsible for knowing, understanding, and following this policy.

Reasonable Accommodations:
New Mexico Tech is committed to protecting the rights of individuals with disabilities. Qualified individuals who require reasonable accommodations are invited to make their needs known to the Office of Counseling and Disability Services (OCDS) as soon as possible. To schedule an appointment, please call 835-6619.

Counseling Services:
New Mexico Tech offers mental health and substance abuse counseling through the Office of Counseling and Disability Services. These confidential services are provided free of charge by licensed professionals. To schedule an appointment, please call 835-6619.

Respect Statement: New Mexico Tech supports freedom of expression within the parameters of a respectful learning environment. As stated in the New Mexico Tech Guide to Conduct and Citizenship: "New Mexico Tech's primary purpose is education, which includes teaching, research, discussion, learning, and service. An atmosphere of free and open inquiry is essential to the pursuit of education. Tech seeks to protect academic freedom and build on individual responsibility to create and maintain an academic atmosphere that is a purposeful, just, open, disciplined, and caring community."

Title IX Reporting:
Sexual misconduct, sexual violence and other forms of sexual misconduct and gender-based discrimination are contrary to the University's mission and core values, violate university policies, and may also violate state and federal law (Title IX). Faculty members are considered "Responsible Employees" and are required to report incidents of these prohibited behaviors. Any such reports should be directed to Tech's Title IX Coordinator (Dr. Peter Phaiah, 20D Brown Hall, 575-835-5187, titleixcoordinator@nmt.edu). Please visit Tech's Title IX Website (www.nmt.edu/titleix) for additional information and resources.

Tentative Lecture Schedule: TBD