ECE481 Course Syllabus

1. **Course number and name: ECE 481:** Digital Communication Systems

2. **Credits and contact hours:** 3 credit hours, 3 contact hours

3. **Instructor's or course coordinator's name:** Moshe Kam

4. **Text book, title, author and year**
   B.P. Lathi and Z. Ding: *Modern Digital and Analog Communication Systems*, Fourth Edition, 2010, ISBN-13: 978-0-19-533145-5 (main text)
   Supplement:
   A.V. Oppenheim, A.S. Willsky, S.H. Nawab: *Signals and Systems*, Second Edition, 1996, ISBN-13: 978-0138147570
   Schaum's Outline of Mathematical Handbook of Formulas and Tables, Fourth Edition, ISBN-13: 978-0071795371, ISBN-10: 007179537

5. **Course Catalog Description:**
   An introduction to digital communications systems and modulation and techniques, along with simulation experiments of communications systems and techniques in Matlab/Simulink. Description of AM and FM modulations, sampling and digitalization of signals, baseband and carrier-modulated digital transmission, signal detection in noise, inter-symbol interference and equalization, channel capacity, data compression techniques, error detection and correction methods.

   Specific course information
   1. brief description of the content of the course
      - Introduction to analog and digital communication systems and techniques; applications, social impact and role in interpersonal communication as well as in political and social campaigns; simulation of communication systems and techniques in MATLAB/Simulink; sampling and digitization of signals; baseband and carrier-modulated digital transmission; signal detection and reception in noise; broad overview of the information-theoretic approach to communications and error-control coding.
   2. Prerequisites
      - ECE321
   3. Indicate whether a required, elective, or selected elective
      - Elective

6. **Specific goals for the course (CLO)**
   The student will be able to
   1. describe and analyze the generation and reception of communication signals;
   2. recognize and provide a block-diagram level design of communication systems that use pulse modulation techniques and digital transmission of analog signals;
   3. recognize and provide a block-diagram level design of communication systems that use digital modulation and transmission systems;
   4. address the effect of noise in the reception of communication signals using random variables and random process models;
   5. describe the basic tenets of information theory as pertaining to communications, and perform basic calculations of relevant properties;

6. describe the basic principles of error-control coding and use them in block-diagram level design of communication systems;
7. use the basic capabilities of MATLAB and Simulink for modeling and simulation of digital communication systems; and
8. recognize the historical and current role that digital communication has on human welfare, communities and societies and on social and political movements.

7. Brief list of topics to be covered

Chapter	Topic	Week
2	Signals and Signal Space	1-2
3	Analysis and Transmission of Signals	3-4
6	Sampling and Analog to Digital Conversion	5-8
14	Error Correcting Methods	9
7	Principles of Digital Data Transmission	10-13
10	Performance Analysis of Digital Communication Systems	14-15

8. Student outcomes addressed by the course (ABET Criterion 3):

1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics (CLO 1-7)
2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors (CLO 1-8)
4. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts (CLO 2, 4, 5, 8)
6. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions (CLO 1-7)
7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies (CLO 4-7).

9. Course Policies

- Homework submission: a homework will be accepted through Moodle. Homework is assigned every Friday and is due by the next Friday 11:55 PM.
- Intellectual Dishonesty: All submitted assignments would consist of the submitter's own work. Seeking help from fellow students is encouraged; however, never ask others to do your work nor let others copy yours. If copying is suspected everybody involved will receive ZERO for the assignment.
- ECE 481 does not have a mid-term exam. Rather, we will have weekly quizzes, administered during the first 15-20 minutes of each class, starting week 3. The quiz will always cover the same material as the homework assigned two weeks earlier. This practice means that you need to be present in class from the beginning.
- All students are allowed two (2) excused absences. Beyond 2 excused absences, every absence will deduct 2% from the student's grade.

10. Grading

- Class participation 10%
- Homework 15%
- Weekly Quizzes 40%
- Final examination 35%.

11. Office hours

- Moshe Kam : 280 Fenster, F 1:00 PM – 2:00 PM
  Or by appointment – please contact Ms. Sheryl Baker
  Email: sheryl.baker@njit.edu
  Phone: 973-596-2314
- Ji-won Choi : 280 Fenster, M 2:30 PM – 4:00 PM
  Or by appointment – send e-mail to jc423@njit.edu

12. NJIT Honor Code

The NJIT Honor Code will be strongly upheld. Violation will be referred to the Dean of Students for disciplinary action.