

## INTRODUCTION TO SPACE COMMUNICATIONS

Instructor: Prof. Norbert Bartel, PSE 331 (Zoom) , [bartel@yorku.ca](mailto:bartel@yorku.ca) [www.yorku.ca/bartel](http://www.yorku.ca/bartel)

Course Number: PHYS 3250 3.0 F

Time/Location: MWF 12:30 – 13:30 / Zoom

Textbooks: *Satellite Communications, 4<sup>th</sup> edition, D. Roddy, McGraw-Hill, 2006*  
(*Satellite Communication Systems Engineering, 2<sup>nd</sup> edition, W. L. Pritchard, H. G. Suyderhoud, R. A. Nelson, Prentice Hall, 1992*  
*Satellite Communications, T. Pratt, C. W. Bostian, John Wiley & Sons, 1986*)

Recommended: Video: Testing Einstein's Universe – The Gravity Probe B Mission, N. Bartel

- Course Contents:
1. History and Overview of Present Status
  2. Orbital Aspects of Satellite Communications
    - 2.1 Orbits
    - 2.2 Perturbations
    - 2.3 Visibility
    - 2.4 Launches
  3. Spacecraft
    - 3.1 Power systems
    - 3.2 Attitude and orbit control
    - 3.3 Telemetry, tracking and command
    - 3.4 Transponders
    - 3.5 Antennae
  4. Earth Station
    - 4.1 Antennae
    - 4.2 Transmitters/receivers
  5. Communications Link
    - 5.1 Transmission path
    - 5.2 Noise temperature
    - 5.3 Link equation
  6. Modulation and Multiplexing Techniques
    - 6.1 Analogue transmission
    - 6.2 Digital transmission
  7. Multiple Access to a Satellite
    - 7.1 FDMA
    - 7.2 TDMA
    - 7.3 CDMA

Evaluation:	In-class quizzes:	10% of final mark
	Homework:	25% of final mark
	Midterm exam:	25% of final mark
	Final exam:	40% of final mark

Office hours: P331, MW 14:00-14:45 Zoom  
Midterm exam: Wed. October 20, 2021, Final exam: TBA