

EEE5921

Electronic Signal Intelligence (ELINT)

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Course Description (Catalog Data)

Overview of Electronic Intelligence (ELINT) Systems, operational aspects of signal emitters, analysis of emitter signals, ELINT receivers, ELINT parameter analysis

Objective

To learn operation of electronic intelligence (ELINT) systems and emitter signal analysis

Course Learning Outcomes (CLO)

Students who succeed this course should be able to

1. describe operation of Electronic Intelligence (ELINT) systems
2. describe emitter signaling and features
3. discuss ELINT receiver operation, and signal analysis
4. read and understand the state of the art in ELINT systems

Pre-requisites

1. Having BSc degree in electrical, electronics or closely related areas
2. Having motivation toward understanding ELINT systems (work/career or thesis oriented motivations!)
3. Having (or willing to dedicate) time for this course

Some desired subjects for understanding ELINT

- Signals and Systems
- Communications
- Electromagnetics
- Electronics

Course Subjects (**tentative**)

- Introduction to Electronic Intelligence (ELINT)
- Operational Aspects of ELINT
- Overview of Emitters
- ELINT Range equation
- Probability of Intercept (POI)
- Direction Finding Systems
- Location Finding
- Pulse analysis
- Pulse De-interleaving
- Carrier Frequency Analysis
- Multi-function emitter Analysis
- ELINT Parameter Limits
- ELINT Data files and formats
- Recent Advances in ELINT Systems

Course Materials

1. **Wiley, R.G., ELINT: The Interception and Analysis of Radar Signals, Artech House, 2006.**
2. **M.I. Skolnik, Introduction to Radar Systems , 3rd ed, McGraw Hill, 2000.**
3. Electronic Warfare and Radar Systems Engineering Handbook, US Naval Air Systems Command, 1999.
4. M.I. Skolnik, Radar Handbook, 3rd ed., McGraw Hill, 2008.
5. A.D. Martino, Introduction to Modern Electronic Warfare Systems, Artech House, 2nd ed., 2018.

Course materials (pdf slides) compiled from the textbooks would be distributed weekly/bi-weekly.

Teaching and learning activities

- ~2 hours/week
 - Classical lecturing (slide-based presentations)
- ~1 hour/week
 - 6-8 Quizzes (last two/three Q's->paper reading)
 - The worst 30% quizzes are ignored!
- Homework (HW) problems (no grading!)
 - Weekly or biweekly (subject based)
 - All quizzes based on HW problems
- All Midterm and Final Exam questions are based on Quiz/HW

Grading Policy (tentative)

Activity	Numbers	Total Weighting (%)
Midterm Exams	1	20
Homework Assignments	6/8	0
Application	-	-
Projects	-	-
Practice	-	-
Quizzes	6/8	45
Final Exam	1	35
Attendance	-	-

Course workload

Activity	Total Number of Weeks	Duration (weekly hour)	Total Period Work Load
Weekly Theoretical Course Hours	14	3	42
Quizzes and preparation for quizzes	6/8	8/6	48
Reading Tasks	-	-	-
Homework Assignments	8 (6)	7	56
Material Design and Implementation	-	-	-
Report Preparing	-	-	-
Preparing a Presentation	-	-	-
Presentations	-	-	-
Midterm Exam and Preparation	1	20	20
Final Exam and Preparation	1	34	34
Other (should be emphasized)	-	-	-
Total Workload			200
Total Workload / 25			8
Course Credit (ECTS)			8