

PH4858 - Electric Ship Weapon Systems (4-1)

A. CATALOG DESCRIPTION: This is the second of a two course sequence teaching the physics and engineering concepts underlying two specific weapon systems currently being development for future US Navy electric ships: the free electron laser and the electromagnetic railgun. For the free electron laser, topics include current program reviews, laser target damage, laser beam propagation through the atmosphere, thermal blooming, the physics of free electron lasers, and free electron laser weapon design. For the railgun, topics include electromagnetic gun theory and critical issues, power conditioning, barrel design, barrel life, projectile design, and system cooling.

B. PREREQUISITE: PH3352

C. LABORATORY: None

D. RECOMMENDED TEXT: None

E. COURSE CONTENTS:

TOPICS	APPROX. HOURS
I. Free Electron Lasers: (28 hours)	
1. Naval mission for the high power laser	4
2. Electric ships, High Energy Laser programs	3
3. Target damage requirements	3
4. Laser beam propagation in the atmosphere	4
5. Free electron laser theory and concepts	4
6. Free electron laser interaction and gain	4
7. Tapered undulators, coherence, short pulse effects	3
8. Short Rayleigh length resonators, tolerances	3
II. Electromagnetic Guns: (16 hours)	
1. Electromagnetic railgun theory	4
2. Power Conditioning	4
3. Materials and Design Considerations	4
4. Target Effects	4

F. SECURITY: Unlimited Public Release

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