

Northwestern University
NAVSCI 345-0 20 Naval Ship Systems I
Naval Engineering
Winter 2002

Monday, Wednesday and Friday 7:30-8:50 am

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| Instructor: | LT Jonathan D. Caverley | Office Hours: | M, W, F (09-1600), Tu (17-2000) |
| Phone: | 847-491-2041 | E-mail: | j-caverley@northwestern.edu |
| Fax: | 847-467-1201 | Classroom: | TECH L251 |

Text: Blank, David A., Arthur E. Bock, and David J. Richardson.
Introduction to Naval Engineering. 2d edition, Annapolis, MD:
Naval Institute Press, 1985.

Naval Education and Training Command. *Principles of Naval Engineering*. NAVEDTRA 12960. Washington, DC: GPO, 1992.

Overview:

The course is designed to provide an elementary overview of Naval engineering systems and a detailed knowledge of the principles behind ship construction. The topics covered include ship design, hydrodynamic forces, stability, propulsion, electrical systems, interior communication, damage control, hydraulics and ship control. Included are basic concepts of the theory and design of steam, gas turbine and diesel propulsion.

This course will help prepare you for your summer cruises and your following career in the following ways: 1) you will be familiar with engineering equipment on board ships and aircraft and be able to identify the equipment; 2) you will understand the theoretical underpinnings behind the equipment; 3) you will have an adequate basis for beginning the study of marine engineering thermodynamics at your first technical school.

Format:

The classroom sessions will consist primarily of lectures. Nonetheless, it is imperative that you come prepared by reading beforehand and be prepared to discuss relevant topics in the classroom. It is also important that you take advantage of outside instruction prior to getting too far behind the course. The beginning of the class will seem to be moving very quickly if you are not prepared and do not keep up. I repeat; this class moves **fast**.

Course Requirements and Grading:

As with all NROTC classes, attendance is mandatory. If you intend to miss class for any reason, you must get permission beforehand. Any unexcused absences will significantly impact your grade. I will disseminate my home number at the first class. Please use it.

The grading criteria are as follows:

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| Homework: | 25% |
| Participation/Quizzes: | 25% |
| Midterm Exam: | 20% |
| Final Exam: | 30% |

Please note that the homework assignments are lengthy and involved and are thus weighted heavily. Homework may be done as a group but must be submitted individually. Missed homework assignments will be given a grade of zero, and tardy assignments will be deducted accordingly.

Your participation grade will be largely determined by your individual class project, to be delivered to the class starting in the fifth week. These topics, while related to the lecture scheduled for that day, will not be a simple rehash of the introductory material covered by my lecture. Rather, they are designed to encourage research, refine your presentation skills, and allow for significant leeway and initiative. Details of these projects will be covered in class.

Extra credit will be available for students who are not performing at the level they expect. Extra credit can be used to move your grade from any point on the grading scale.

SCHEDULE OF TOPICS

| Date | Topic | Reading |
|---------------|--|---|
| 14 January | Introduction/Principles of Measurement | INE App A pp 511-516 PNE Ch 7 pp 1-18 |
| 16 January | Thermodynamics I | INE Ch 1 pp 3-5 INE Ch 2 pp 9-14,16 PNE Ch 8 pp 1-14 |
| 18 January | Thermodynamics II (cont.) | INE Ch 2 pp 14-16,28-38 PNE Ch 8 pp 14-32 |
| 21 January | Martin Luther King Day NO CLASS | |
| 23 January | Pumps, Valves and Fans | INE Ch 28 pp 477-501 PNE Ch 18 pp 10-20 PNE Ch 19 pp 1-19 |
| 25 January | Quiz 1 Main Steam Cycle | INE Ch 1 pp 6-7 INE Ch 1 pp 6-7 PNE Ch 9 pp 1-12 |
| 28 January | Main Condensate and Feed Systems | INE Ch 9 pp 165-174 INE Ch 10 pp 175-192 PNE Ch 13 pp 1-7 |
| 30 January | Nuclear Power Fundamentals | INE Ch 7 pp 89-114 PNE Ch15 pp 1-18 |
| 1 February | Diesel Engines | INE Ch 11 pp 195-222 PNE Ch 17 pp 1-44 |
| 4 February | Gas Turbine Theory | INE Ch 12 pp 225-244 PNE Ch 16 pp 1-35 |
| 6 February | Quiz 2 The Gas Turbine Propulsion Plant | INE Ch 12 pp 244-263 |
| 8 February | Tulane Drill Meet NO CLASS | |

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| 11 February | Power Train Components | INE Ch 8 pp 143-164 PNE Ch 5 pp 1-20 |
| 13 February | MID-TERM EXAM | |
| 15 February | Fuel/Lube Oil Systems Distilling Plants | INE Ch 6 pp 81-84 PNE Ch 6 pp 1-9 PNE Ch 9 pp 19-21 INE Ch 14 pp 283-292 PNE Ch 21 pp 1-20 |
| 18 February | Presidents' Day NO CLASS | |
| 20 February | Hydraulic Systems and Applications | INE Ch 15 pp 293-306 |
| 22 February | Fundamental Electrical Theory | INE Ch 16 pp 307-318 PNE Ch 20 pp 1-20 |
| 25 February | Shipboard Electrical Distribution | INE Ch 17 pp 319-322 PNE Ch 20 pp 21-35 |
| 27 February | QUIZ 3 Compressed Air Systems Refrigeration and Air Conditioning Plants | INE Ch 18 pp 333-340 PNE Ch 23 pp 1-21 INE Ch 19 pp 341-351 PNE Ch 22 pp 1-17 |
| 1 March | Engineering Documentation Ethical Issues: Logs and Records | INE Ch 29 pp 502-510 Safety Manual for Division Officer (Handout) |
| 4 March | Ship Design and Engineering | INE Ch 20 PNE Ch 2 |
| 6 March | Principles of Stability | INE Ch 22 pp 389-400 INE Ch 23 pp 401-402,419 PNE Ch 3 pp 1-10 |
| 8 March | QUIZ 4 Damage Control | INE Ch 25 Bluejacket's Manual, Ch 18 (Handout) |

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| 11 March | Damage Control Systems and Equipment | INE Ch 26 Bluejacket's Manual, pp 399-422 (Handout) |
| 13 March | Review | |
| 15 March | FINAL EXAM | |