

DEPARTMENT OF MATHEMATICAL SCIENCES
United States Military Academy

AY 07-02
INSTRUCTIONAL MEMORANDUM
NUMBER 488-1

9 January 2007

MA488 – SABERMETRICS

1. **Purpose:** This memorandum announces specifies material, describes the goals and philosophy, and announces policy and procedures for MA488.
2. **Texts Used:** Curve Ball: Baseball, Statistics, and the Role of Chance in the Game, Albert and Bennett.
3. **Software Used:**
 - a. Minitab
 - b. *Word* – Microsoft
 - c. *Excel* – Microsoft
4. **Goals and Objectives:**
 - a. This course is designed to expand the statistical understanding that you gained in MA206. It is assumed that you are both familiar and capable of applying the statistical concepts covered in this pre-requisite course. The course will build on this base material by developing your skills in applying statistical techniques to baseball and by introducing advanced statistical techniques common in a 400-level statistics course.
 - b. The objectives of each lesson are detailed in the lesson notes. Much of the class time will be used to discuss the statistical topics. Applications and rationale driving these statistical concepts are discussed in the chapter readings. It is both imperative and assumed that you have read the book prior to coming to class. It is not about the Thayer method, it is about being able to discuss the baseball and statistical topics relevant to the day's lesson.
 - c. The goals of this course are listed below.
 - 1) Use the concepts of statistics and probability learned in MA206.
 - 2) Use advance statistical concepts (multiple regression, logistic regression, forecasting, poisson processes, etc) to analyze baseball data.
 - 3) Use technology appropriately to gain insight into a solution of a problem.
 - 4) Appreciate the relevance of baseball in utilizing statistical methods by investigating application problems and presenting results.
5. **Evaluation:** Your performance in this course will be evaluated both in and out of class. Out of class efforts will consist of six short projects and a major project. In-class efforts may consist of written exercises, presentations, and class participation. Success in this course depends heavily on your daily preparation. Without a concerted effort on your part, you will not achieve the level of understanding necessary.
 - a. Point Distribution

| <u>Requirement</u> | <u>Points</u> | <u>Weight(%)</u> |
|--------------------|---------------|------------------|
| Projects | 500 | 50.00 |
| Term Project | 200 | 20.00 |
| Mid Term Exam | 100 | 10.00 |
| Term End Exam | 200 | 20.00 |
| Total | 1000 | 100.00 |

b. Final course grades will follow this Department's standing guidelines. Scores in the listed ranges are guaranteed the following minimum grades, with refinements made for plus and minus grades.

| <u>Percentage Achieved</u> | <u>Grade</u> |
|----------------------------|--------------|
| $90\% \leq x \leq 100\%$ | A |
| $80\% \leq x < 90\%$ | B |
| $70\% \leq x < 80\%$ | C |
| $65\% \leq x < 70\%$ | D |
| $x < 65\%$ | F |

6. Finally, this is your mathematics education. Baseball creates a sense of passion in many of us to root for a certain player or team, but there must be some underlying statistical basis for comparing players. A successful leader uses all possible resources to accomplish the mission. I encourage you to use all possible resources to be successful in this course.

Ft. GABRIEL COSTA
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LTC, AD
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LTC, OD
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| Date | Day | Lesson | Topics | Section |
|--------|-----|--------|-------------------------------------|---------------------------|
| 8-Jan | Mon | 1 | Course Introduction | Ch 1 |
| 10-Jan | Wed | 2 | Student Presentations | |
| 12-Jan | Fri | 3 | Simple Models - APBA, Strat-O-Matic | Homework 1 - Due Jan 19th |
| 15-Jan | Mon | | MLK Day | |
| 17-Jan | Wed | 4 | The History of Baseball Statistics | |
| 19-Jan | Fri | 5 | Simulation | |
| 23-Jan | Tue | 6 | Exploring Data | Ch 2 |
| 25-Jan | Thu | 7 | Exploring Data | Ch 3 |
| 29-Jan | Mon | 8 | Exploring Data | |
| 31-Jan | Wed | 9 | Simple linear Regression | |
| 2-Feb | Fri | 10 | Multiple Regression | Ch 7 |
| 6-Feb | Tue | 11 | Multiple Regression | |
| 8-Feb | Thu | 12 | Multiple Regression | |
| 12-Feb | Mon | 13 | ANOVA | Ch 4 |
| 14-Feb | Wed | 14 | ANOVA | |
| 20-Feb | Tue | 15 | Presidents Weekend | |
| 22-Feb | Thu | 16 | ANOVA | |
| 26-Feb | Mon | 17 | ANOVA | |
| 28-Feb | Wed | 18 | Trip 1 | |
| 2-Mar | Fri | 19 | Offensive Performance | Ch 6 |
| 6-Mar | Tue | 20 | Offensive Performance | |
| 8-Mar | Thu | 21 | Mid Term Exam | |
| 20-Mar | Tue | 22 | Spring Break | |
| 22-Mar | Thu | 23 | Logistics Regression | |
| 26-Mar | Mon | 24 | Logistics Regression | |
| 28-Mar | Wed | 25 | Logistics Regression | |
| 30-Mar | Fri | 26 | Streakiness | Ch 5 |
| 3-Apr | Tue | 27 | Time Series Analysis/Forecasting | Ch 11 |
| 5-Apr | Thu | 28 | Time Series Analysis/Forecasting | |
| 9-Apr | Mon | 29 | Time Series Analysis/Forecasting | |
| 11-Apr | Wed | 30 | Time Series Analysis/Forecasting | |
| 13-Apr | Fri | 31 | Best Team | Ch 12 |
| 17-Apr | Tue | 32 | Game Theory | |
| 19-Apr | Thu | 33 | Game Theory | |
| 23-Apr | Mon | 34 | Trip 2 | |
| 25-Apr | Wed | 35 | Modeling Rare Events | |
| 27-Apr | Fri | 36 | Modeling Rare Events | |
| 1-May | Tue | 37 | Project Drop | |
| 3-May | Thu | | | |
| 4-May | Fri | 38 | Reading Day | |
| 8-May | Tue | 39 | Final Project Briefings | |
| 10-May | Thu | 40 | Final Project Briefings | |
| 14-May | Mon | | Term End Examinations Begin | |