

## **Course Development for the Transportation Graduate Program at UMR**

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The objective of this project was to develop courses in transportation systems analysis, infrastructure management and public transit.

The transportation faculty at UMR overhauled and updated the graduate curriculum in the transportation area resulting in three new courses that needed to be developed. This Project provided graduate assistance in collecting materials, conducting literature searches and compiling information for the new courses. Materials were collected from primarily on-line sources for a civil infrastructure course, transportation systems course, public transportation course and an airport design course. Please see attached syllabi.

This Project supported the Mission of the UTC in that it facilitates the development of a viable transportation graduate program at UMR. These materials have been used in developing and offering the four courses described above. The courses have provided more than fifteen graduate students in the past 2 years the opportunity to study transportation at the graduate level.

**Title of Course:** Infrastructure Engineering and Management

**Professor:** Gary S. Spring

**Contact Info:** Room 208, Butler-Carlton Hall, Email: [spring@umr.edu](mailto:spring@umr.edu), Phone: 573-341-6286, website: <http://www.umr.edu/~spring/CE301/>

**Prerequisites** A junior-level highway/transportation engineering course analogous to Cv Eng 211 with grade of "C" or better.

**Text:** Modern Pavement Management, by Ralph Haas, W. Ronald Hudson and John Zaniewski, Krieger Publishing Company, 1994.

### CATALOG DESCRIPTION

This course describes the process of managing public infrastructure in all its complexity in sufficient detail to allow the student to gain a realistic grasp of contemporary public infrastructure management policies and practices, defines the infrastructure deterioration problems in the United States, and describes the engineering and management approaches to arrest the deterioration.

### COURSE OBJECTIVES

Upon completion of this course the student will be able to:

1. Identify inventory and attribute data types required for performance prediction for different types of civil infrastructure,
2. Select appropriate deterioration modeling methods for different types of infrastructure and different levels (project/network) of infrastructure management,
3. Perform engineering-economic analysis calculations to prioritize competing projects for investment,
4. Explain the political, administrative and financial mechanisms for managing civil infrastructure around the country, and,
5. Discuss the strengths and limitations of different infrastructure management approaches being used around the country.

### TOPICAL OUTLINE

Topic	Readings (Chapters)
Introduction to IMS and PMS	Part 1
Inventory Management	Part 2
Modeling and evaluating performance	Part 3
Implementation	Part 5

## POLICIES

### Term Paper

Your assignment is to choose one aspect of managing pavements systems, do a review of the relevant literature on that topic and for non-technical papers provide a thorough discussion of the issues involved in your topic. For technical papers, you will need to collect some data (I can help you with this) and apply your chosen tool to the data.

The manuscript must be typed double-spaced on one side of 8 1/2 x 11 inch paper and are to be no more than 25 pages in length including all exhibits and the Executive Summary. This is a maximum, not a minimum. Ideal length is about 20 pages. Papers are to be submitted electronically via the course website's drop box Students whose papers are deemed of "high quality" will be asked their permission in the grade response message to post their papers on the Institute's Web site.

References should be typed double-spaced as well. They should be listed in alphabetical order (in order of increasing years when there is more than one reference by the same author). When citing a reference include the primary author's name and year of publication in brackets. For example, the reference listed below:

*Spring, G. S., Collura, J., Shuldiner, P. W., Watson, J., "Testing, Verification and Validation of Expert Systems: A Case Study," ASCE Transportation Engineering Journal, Vol. 117, No. 3, 1990, pp. 350-360*

would be cited in the body of the paper as: [Spring, et al, 1990]

### Grading Criteria for Final Paper Submission

Papers will be graded based upon thoroughness of the Description reflecting your understanding of the key facts of the situation, the quality and depth of the Analysis, and the thoughtfulness and validity of the Recommendations.

This is a graduate level course. You are therefore expected to present your thoughts clearly and to write intelligibly. Failure to do so is just grounds for deducting points. To help you to think analytically and write reflectively, I offer the following suggestions:

- 1) Take some time to think about each question before answering it
- 2) Be concise
- 3) Break your answers down into numbered, logically sequenced paragraphs
- 4) Give examples where applicable. You may summarize your example, rather than describe it in detail, but enough detail should be provided to make your examples and arguments clear.
- 5) Be specific. Hand waving, name dropping (of programs) and tossing around terminology without demonstrating your understanding will not buy you points.
- 6) Your answers should be clear enough so that a person with an opposing view could argue against each of your assertions.

You are encouraged -- but not required -- to talk with me about your choice of topics and/or other aspects of your paper.

**Attendance**

You are expected to attend all classes. If you are unable to attend, you will still be responsible for all materials covered and for meeting all class requirements. In the event of repeated absence due to illness or official University functions, I urge you to discuss the situation with me.

**Participation**

I will assign a paper review each week dealing with that week's topic. At the beginning of the next lecture period, we will have 2 or more of you discuss your paper followed by a class discussion. Submit your 1 page reviews in the e-drop box.

**Quizzes**

At the beginning of each lecture we will do a "Jeopardy" style quiz. I will flash a question relating to the day's assigned reading and students will raise their hands to answer. Each question answered correctly is worth 1 point. Each question answered incorrectly is worth -1 point. At the end of the semester I will total quiz points and will assign the maximum number of points to the person who earned the most points and proportionately fewer points to each of the others in the class.

**Grading**

Quizzes	15%
Term Paper	40%
Term Project	20%
Assignments, class participation, preparation, intangibles	25%

**Title of Course:** CE 411 Transportation Systems Analysis (Lec 3.0) - Elective

**Catalog Description:**

Concepts and principles fundamental to the planning, design, operation, and management of transportation systems using a systems perspective to transportation problems. Concepts from economics, engineering, operations research, management, psychology, and public policy analysis are used throughout. Topics include linear and non-linear programming, dynamic programming, supply-demand microeconomic framework, analysis of transportation demand, system performance, network equilibrium, simulation and associated case studies.

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**Prerequisites:**

Graduate standing

**Textbook:**

1. Introduction to Transportation Systems, Joseph Sussman, Artech House, 2000.

**Topical Outline**

Introduction to systems and systems analysis (1 week)

Performance analysis (approximately 7 weeks)

- Introduction to performance modeling

- Algebraic optimization methods

- Linear programming

- Integer programming

- Non-linear programming

- Multi-objective programming

- Queuing

- Simulation

- Reliability analysis

Evaluation (approximately 4 weeks)

- Introduction to systems evaluation

- Economic principles

- Institutional issues

**Reference #:** 20620  
**Lecture:** Tuesday and Thursday, 11:00 – 11:50 AM, 316 Butler Carlton Hall  
**Lab:** Wednesday 1:00 – 3:50 PM, 316 Butler Carlton Hall

**Instructor:** Dr. Mohammad Qureshi  
**Office:** 134 Butler Carlton Hall  
**Office Hours:** Wed 10:00 - 11:00 AM OR whenever my door is open OR by appointment  
**Email:** [qureshim@umr.edu](mailto:qureshim@umr.edu)  
**Phone:** 341-4693

**Course Website:** <http://blackboard.umr.edu/>

**Prerequisites:** Cv Eng 211 with grade of "C" or better.

**Text:** *Planning and Design of Airports*, 4th Edition, Horonjeff & McKelvey, McGraw-Hill, 1994. ISBN 0-07-045345-4

### **CATALOG DESCRIPTION-**

Runway configuration, airfield capacity, geometrics and terminal layout and design. Aircraft performance; navigation and air traffic control; airport planning and design; airline operations; aviation systems planning.

### **GOALS**

This course will utilize a problem based learning (PBL) approach. Consequently, the primary goal of the course is to solve the problem. For this semester, there are two problems: design of the North Central Missouri Regional Airport and the layout of a new terminal building for the Joplin Airport. These problems will serve as the focal point of the learning activities. Students will identify topics in which expertise will be required and then identify resources for acquiring this expertise.

### **COURSE GRADES**

I will calculate a weighted average grade using the following distribution:

Project (2 @ 20% each)	40%
Term Paper	20%
Participation	20%
Folios/Homework	20%

A weighted grade of 90 or above is guaranteed an A, 80 or above at least a B, 70 or above at least a C and 60 or above at least a D. However, curving of grades may enable students to get higher letter grades than this list indicates.

### **POLICIES AND PROCEDURES**

#### **Folios**

As part of your class requirements, you will organize and maintain a folio. This folio will serve as a repository for all your work over the course of the semester. This folio will be reviewed by

the instructor on a scheduled basis and at random. Scheduled reviews will be announced at least one week prior to submission.

General requirements:

1. Use a three ring binder
2. Use indexed dividers
3. Have a section for class notes and teacher meeting minutes
4. Have a section for homework
5. Have a section for lecture notes you prepare
6. Maintain an annotated bibliography of resources you have consulted such as journal papers and websites.

### **Homework**

When and if homework is assigned, you will be graded not only on technical accuracy but also on neatness and uniformity. Use of a word processor and/or spreadsheet is strongly encouraged. All figures and sketches should be drawn using straightedges and/or curves and should be clearly labeled. Lettering must be of engineering quality. Calculations should be concise, and should proceed from beginning to end in a clear and logical manner. Indicate your answers by either underlining or boxing them, and place them at the right side of your paper.

Homework solutions will be available via the blackboard site. It is your responsibility to make sure you find out how to solve the problems by getting help before they are due and/or asking about them after they have been handed in.

### **Grading Philosophy**

I am firm believer in basic concepts. This course will never be able to cover all the problems you will encounter in the real world. My goal is to help you learn how to identify the problem and then to identify the proper course of action to address the problem. Therefore, the focus of the grading will be to stress conceptual understanding. Applying a formula correctly is not hard for bright students of your caliber. The real key is knowing which formula to apply and when to apply it! Thus mathematical errors will result in smaller deductions, while failure to demonstrate a conceptual understanding will result in larger deductions.

### **Honesty**

Very simple: You cheat, you fail!

### **Attendance and Class Participation**

In a PBL-based approach, student participation and preparation are instrumental in the conduct of the course. I expect each of you to actively involve yourself in this course. It is difficult to be involved in class when you are absent. Therefore, attendance is an integral part of your grade. Unexcused absences will adversely affect your grade

### **Grade Disputes**

I realize that from your perspective grades are very important. My objective in grading is to be consistent. This is different that trying to be fair. Fairness is highly subjective. My definition of fair will be different than yours. You may dispute whether your answer is right or wrong and you

may also dispute the consistency of the grading. However, the number of points deducted for an error is not a negotiable item.

Please do not ask me to review your exam at the end of the class period. Doing so only puts us in an awkward and potentially confrontational situation. Take some time to review the grading and talk to your classmates about how they were graded. If you are still unsatisfied, then request a review of your grading

If you would like a review of the grading on an exam or homework, then submit in writing your reason for requesting a review. Describe in as much as detail as possible your reasons for requesting a review and provide supporting materials where appropriate.

Once I have received your written request, I will make a decision regarding your request within 1 week. I will then provide a written response to your request and we can discuss it in more detail if you so desire.

**Disclaimers:**

1. This policy does not affect the review of your course grade, which must be handled through the appropriate University processes.
2. While I reserve the right to award credit during the review of your exam, I also reserve the right to deduct points for errors found during the review. To rephrase, if I find an error on your exam that I had not caught in my initial grading, I may deduct additional points during the review of your grading.
3. Placement of your request in my mailbox does not constitute receipt of your request. The 1-week response period begins when I actually see your request.