CIVIL 767 – ADVANCED PAVEMENT ENGINEERING
PAVEMENT MATERIALS AND DESIGN
(15 Points, FS 2012)
(ME., M.Eng. St., Diploma Etc.)

COURSE CO-ORDINATOR: Dr Theuns Henning (Room 1.1212, ext. 88181)

GUEST LECTURERS: Dr. Mofreh Saleh
David Alabaster
Dr. Fritz Jooste

ASSESSMENT: 70% Final Exam (3 hours)
30% Coursework (assignment/test)

OBJECTIVE:
This 15-point Masters paper is a specialised course in the Masters programme in Transportation Engineering. The course covers three key areas of pavement engineering, namely pavement design, rehabilitation investigation/design and asphalt technology. The first part of the course is designed to provide the participant with a sound understanding of pavement materials, test methods, pavement behaviors and design. Such an understanding is essential for those involved in the design and construction of pavements. The second part of the course is designed to provide the participant with a sound understanding of rehabilitation investigations and design approaches. It covers the current methodologies used for the rehabilitation design of flexible pavements and maintenance projects. The last part of the course covers aspects related to the design and rehabilitation of asphalt surfaces and pavements. At the end of the course the student will be able to conduct recognized design procedures for application in New Zealand plus have an understanding of other international methods and processes.

COURSE OUTLINE:
Some minor changes to these topics may be made, depending upon availability of lecturers.

Pavement Materials and Asphalt Design
This element of the course is designed to provide the participant with a sound understanding of pavement materials through a series of lectures, tutorials and, if possible to arrange, laboratory visits. Topics to be covered are expected to include:
- Aggregate sources, properties and classification methods.
- Extraction and processing
- Sampling and testing
- Bituminous binder types, properties and tests
- Volumetric properties
- Mix design principles, methods and specifications (Marshall Mix Design, APRG18 Level I, Level II and Level III)

Pavement Design
This element of the course is designed to provide the participant with a sound understanding of pavement structural design and analysis. It covers the current methodologies used for design of flexible pavements. This includes the application of stress distributions in flexible pavements using Boussinesq’s and Westergaard’s solutions, material characterization and the prediction and evaluation of traffic loadings. The Austroads and other methods for flexible pavement design will be covered. The
CIRCLY and Rubicon computer programs for flexible pavements will be utilized. In addition, the participants will be introduced to principles of backcalculations and the ability to analyse and interpret the FWD data.

**Rehabilitation Design**

For the Rehabilitation design most investigatory and diagnostic methods and procedures will be covered. The rehabilitation design processes and construction methods will also be presented. Most of the design methods and processes used for new pavement design are also applicable for rehabilitation design. At the end of the course the student will be able to apply these methods for both applications.

**FORMAT:**

The course is presented in block mode consisting of two block weeks of three days each. Lectures start at 9:00 am to 5 pm, except if arranged differently for specific days.

**Block One**

Dates: 7,8,9 March 2012

Venue: 810-225 (1-11 Short Street Law School)

**Block Two**

Dates: 2,3,4 May 2012

Venue: 810-225 (1-11 Short Street Law School)

A detailed schedule will be supplied separately at the beginning of the course. This will set out the topics of the lectures and tutorials, and details on the assessments. Lectures will cover the main information and principles including the issue of notes where appropriate, however, additional reading will be required for this course.

**PROJECT/ASSIGNMENTS**

Details of the project/assignment will be presented at the end of block one. The project/assignment due date is Friday 20th April 2012.

**TEXTBOOKS AND REFERENCES:**

Where appropriate lecture material from these texts will be supplied at no extra charge (they are also available in the School of Engineering Library).

9. TRH 12 South African guideline on *Flexible Pavement Rehabilitation Investigation and design*.
10. Various New Zealand and British Standards for testing of aggregates.