

## CMG 8102 Systems Engineering

Hours Per Week			Hours per Semester	Weighted Total Mark	Weighted Exam Mark	Weighted Continuous Assessment	Credit Units
LH	PH	TH	CH	WTM	WEM	WCM	CU
3	0	3	45	100	60	40	3

### Course Description

The course is geared at taking the student through the principles of systems engineering of operations research. It covers Monte carlo simulation of financial and construction models, decision and utility theory, dynamic programming, queuing theory applications to construction management, stock control, planning and organization, resource leveling and smoothing, project cost-time algorithms, formulation and application of linear programming, Simplex method, transportation and assignment problems, bidding theory, risk analysis and project appraisal.

### Objectives/Aim

- To enable the student understand the principles of operations research in management of construction projects and processes.

### Course Outline

1. Monte carlo simulation of financial and construction models. [10CH]
2. Decision and utility theory. [10CH]
  - 2.1 Dynamic programming.
  - 2.2 Queing theory applications to construction management.
3. Stock control technique selection [10CH]
4. Construction planning and organization, [10CH]
  - 4.1 CPM/PERT,
  - 4.2 resource leveling and smoothing
5. Project cost-time algorithms. [10CH]
  - 5.1 Formulation and application of linear programming
  - 5.2 Simplex method,
  - 5.3 transportation and assignment problems.
6. Bidding theory, risk analysis and project appraisal [10CH]

### Learning Outcomes

The student will be able to:

- Understand and use the principles of operations research in the construction environment.

### Method of Teaching/Delivery

The course will be conducted through lectures, tutorials and assignments. Basic lecture materials provided by the Lecturer will be supplemented by individual reading effort by students.

**Assessment Method**

Continuous assessment through assignments and tests, and final written examination. The final examination carry 60% of the total mark., while continuous assessment will carry a total of 40%.

**Reading/ Reference Materials**

1. Taylor, R(2008) Operations Management. Prentice Hall
2. Dennis and Dennis (2005) Management Science, Wiley, New York

**Research & Dissertation**

Hours Per Week			Hours per Semester	Weighted Total Mark	Weighted Exam Mark	Weighted Continuous Assessment	Credit Units
LH	PH	TH	CH	WTM	WEM	WCM	CU
3	18	21	135	100	100	0	12

**Course Description**

The research project provides the student with experience in the planning and execution of a personal research project. Students design a research project with specified aims and objectives in an applied field of Construction Management. This incorporates a review of relevant literature, data capture, analysis and output of results, applying appropriate use of Construction Management technology. Results are communicated by oral and written means.

**Objectives/Aim**

This Course aims to develop student’s skills to develop research questions, design research projects, collect data from various sources, and present findings in a scientific way.

**Course Outline**

Each student will be required to plan an investigation and analyse, collate and present the findings in report form. This will involve the hypotheis inductive method of research, survey and interviewing techniques, questionnaire design etc. the project will be chosen in the context of the individual’s present or future employment intentions or areas of special interest. Various topics are expected to be covered by participants, including case studies, contract procedure, information technology, project management, estimating and cost control, structural failures, low cost construction, innovations in construction materials and technology, durability, vernacular materials, etc.

**Learning Outcomes**

The course will equip the student with

- Ability to carry out independent research
- Writing and disseminating research findings.

**Method of Teaching/Delivery**

The student interacts with two selected tutors on a regular basis to obtain guidance on the research. The student on his own to produce the work.

**Assessment Method**

The rules of assessment of research reports for Graduate students at Makerere University will apply. A student will prepare a research proposal in collaboration with a member of staff. The proposal will be presented and approved by the departmental research committee. The final report submitted and accepted will be marked according to the guidelines from the School of Graduate studies. A viva Voce is an integral component of the examination process.

**Reading/ Reference Materials**

Varied depending on the topic.