

# Open PhD-position in Operations Research at Ghent University

*Approximate Evaluation Techniques for Large Queueing Networks in Production Environments*

- **Application due date:** 15 June 2014
- **Department:** EA18 Department of Industrial Management, Faculty of Engineering and Architecture, Ghent University
- **Employment:** full time
- **Vacancy type:** 4-year doctoral scholarship
- **Start of contract:** summer/fall 2014

## Project description

A challenging problem in the design and dimensioning of the production layout in manufacturing facilities, is the ability to predict the performance of these systems early in the design phase. A typical production network consists of several interconnected work stations between which items are conveyed along different routes from one station to the next. In turn, a work station consists of a local stock of items in a certain phase of production, waiting to be processed by a machine or worker. Sometimes, the production network is strictly linear, i.e. a production line of subsequent work stations or stages (multi-stage production system). In many cases however, the network forms a general directed (possibly cyclic) graph where several types of items follow a different path over this graph. Design engineers need to know in advance how their design of the production network will perform in terms of achievable throughput, probability of over/understock at the work stations, total lead times, influence of stand-stills or setups and machine usage. This knowledge can then be used to optimise the design, e.g. in terms of topology, routing, stock sizes, number of machines, production rates, etc.

In the project, we will describe such production networks as *queueing networks*. In literature, the performance evaluation of these networks has been studied extensively, but almost always using exact methods that require a huge amount of computational power. The size of the networks that can be evaluated with these methods is therefore limited. The goal of this project is to develop new methods and refine newly proposed approaches which describe the queueing behaviour in an approximate way, but in return, allow to consider larger networks.

## Job profile

The candidate

- is expected to perform high-quality scientific research, under the supervision of staff members of the department and aimed at obtaining a PhD degree.
- must hold an MSc in Engineering Science, Computer Science, Mathematics, Physics or equivalent.
- must have a strong interest in mathematical operations research techniques, probability theory, stochastic simulation, statistics and mathematics in general. Good communication skills in English are also required, as well as an interest or experience in computer programming.

## How to apply

An application should enclose a C.V. including a list of courses followed and the grades obtained, a short motivation statement explaining your interest in this PhD position. Applications should be sent to Prof. Stijn De Vuyst ([stijn.devuyst@UGent.be](mailto:stijn.devuyst@UGent.be)) and/or Prof. El-Houssaine Aghezzaf ([elhoussaine.aghezzaf@ugent.be](mailto:elhoussaine.aghezzaf@ugent.be)). For questions about the scientific content of this job offer, also contact Prof. Stijn De Vuyst.

The position is open at least until 15 June 2014, and then until filled. To ensure full consideration of their application, interested candidates are encouraged to apply as soon as possible.