UNIVERSITY OF SKÖVDE

COURSE SYLLABUS

Industriell optimering: modeller och metoder, Forskarnivå
Industrial Optimization: Models and Methods, Post-graduate level
5 credits

Course Code: IT0939F
The Course Syllabus applies from: Jul 1, 2020
Date of Approval: May 4, 2020
Version Number: 1

Third-cycle Subject Area: Informatics

Academic Level: Post-graduate level

1 Name, Scope and Level of the Course

The course is given by the University of Skövde and is named Industrial Optimization: Models and Methods, Post-graduate level. It comprises 5 credits and is on Post-graduate level.

2 Objectives

After completed course the doctoral student should be able to:

- Develop mathematical models and exact algorithms for industrial and combinatorial optimization problems
- Understand the function and use of the commonly used computer software for solving mathematical optimization models
- Describe and apply certain exact solution methods for solving industrial optimization problems
- Understand and discuss the importance of exact solution approaches and mathematical optimization
- Compare and contrast exact and approximation solution approaches for their advantages and disadvantages in dealing with different optimization problems
- Read, understand and effectively communicate the related scientific papers.

3 Course Content

This course studies scientific strategies to support decision making through mathematical modeling. It seeks to design, improve, and operate complex systems through mathematical modeling and has various applications in business, engineering, health care, and industry. The emphasis will be on industrial optimization problems, but problems from other domains will also be discussed in the course.

In industrial optimization, heuristic methods are sometimes used in cases when analytic methods that always find an optimal solution could easily be applied. This course provides the student with a good background in analytic optimization methods to cope with a variety of industrial problems. The course provides knowledge about different forms of mathematical optimization models as well as exact solution approaches. The course contains both a theoretical and a practical part. The theoretical part focuses on learning and developing different types of mathematical optimization models as well as learning and applying certain exact solution methods for solving industrial optimization problems. In the practical part, through a hands-on approach supported by computer software, the student will learn how to solve the mathematical optimization models using an appropriate method for each model type.

4 Forms of Teaching

The teaching comprises lectures, laboratory sessions, project work, supervision and presentations.

The teaching is conducted in English.

5 Examination

The course is graded Fail (U) or Pass (G).

Registration of examination results:

Name of examination	Credits	Grading
Written assignment	2 hp/credits	U/G
Laboratory assignment	2 hp/credits	U/G
Project presentation	1 hp/credits	U/G

To obtain a final passing grade of the course, each part of the examination must have been approved.

6 Admission Requirements

The admission requirements of the course are general entry requirements for third-cycle courses and study programmes, i.e. a second-cycle qualification or satisfied requirements for courses comprising at least 240 credits of which at least 60 credits were awarded in the second cycle, or the equivalent.

In order to fulfil the specified entry requirements the applicant must have completed academic courses of at least 60 credits, including independent thesis writing of at least 15 credits at advanced level, within the field Informatics, applicable areas of a similar kind or other fields which are directly judged as relevant for the Licentiate or PhD thesis.
Furthermore, a passing grade in the high school course English B or the equivalent is required. This is normally demonstrated by means of an internationally recognized test, e g IELTS or TOEFL or the equivalent.

7 Third-cycle Subject Area

The course forms a part of the third-cycle subject area of Informatics at the University of Skövde.

8 Approval of Course and Course Syllabus

This course was approved by the Commitee for the Doctoral Programme in Informatics May 4, 2020. This course syllabus was ratified by the Commitee for the Doctoral Programme in Informatics May 4, 2020. It is valid from Jul 1, 2020.

9 Overlapping with Another Course

This course cannot constitute a part of a degree also containing a course, the content of which is totally or partly equivalent to the content of this course.

10 Additional Information

Further information will be available on the university's website before the course is provided.

National and local regulations for higher education are available on the university's website.

During and after the course there will be a follow-up evaluation concerning the learning outcomes. The main objective of the follow-up is to contribute to improving the course. The research students' experience and points of view constitute one part of the scrutiny and are obtained through written group course evaluation/discussions. The research students are to be informed about the outcome of these as well as possible decisions concerning steps to be taken.

11 Course Literature and Other Educational Materials

Reading material, handouts, and research papers as provided by the instructor.

References

Gärtner, B. & Matouek, J. *Understanding and Using Linear Programming*, 2007. Springer. ISBN 9783540307174.

Hamdy, A. T. (2013). *Operations Research: An Introduction.* (9th ed.) Pearson. ISBN 933251822X.

Hillier, F. S. & Lieberman, G. J. (2014). *Introduction to Operations Research.* (10th ed.) New York: McGraw-Hill. ISBN 1259162982.

Korte, B. and Vygen, J. *Combinatorial Optimization*, 2018. (6th Ed.) Berlin: Springer. ISBN 9783662560389.

Snyman, J. A. & Wilke, D. N. *Practical Mathematical Optimization: Basic Optimization Theory and Gradient-Based Algorithms*, 2018. (2nd Ed.) Springer International Publishing AG. ISBN 9783319775852.

Williams, H.P. *Model Building in Mathematical Programming.* (5th Ed.) Wiley. ISBN 9781118443330.