1.1 GENERAL INFORMATION

- **Course:** TTK16 Mixed Integer Optimization in Energy and Oil and Gas Systems

- **Instructor:**

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1.2 GOALS

Develop modeling and problem-solving abilities in mixed-integer linear optimization with emphasis on piecewise-linear approximation. The specific topics are:

1. introduction to optimization;

2. proxy modeling;

3. fundamentals of mixed-integer linear programming;

4. branch-and-bound and cutting-plane algorithms;

5. piecewise-linear approximation;

6. AMPL modeling language;

7. applications in petroleum science and engineering;

8. introduction to mixed-integer nonlinear programming.

1.3 REFERENCES

- Lawrence Wolsey, *Integer Programming*, Addison-Wesley, 1998.

- Robert J. Vanderbei. *Linear Programming: Foundations and Extensions*, Springer, Second Edition, 2001.

- Christodoulos A. Floudas, *Nonlinear and Mixed-Integer Optimization: Fundamentals and Applications*, 1st Edition, Oxford University Press, 1995.

1.4   CLASS SCHEDULE

Class	Date	Topic
1		Fundamentals
2		Introduction to modeling
3	Monday	Practice session
4		Review of linear programming
5		Introduction to integer programming
6		Practice session
7		Relaxations and bounding
8		Branch-and-bound algorithm
9	Tuesday	Practice Session
10		Valid inequalities
11		Cutting-plane algorithm
12		Practice session
13		Piecewise-linear approximation: one dimensional
14		Piecewise-linear approximation: multidimensional
15	Wednesday	Practice session
16		Gas-lift allocation problem
17		Introduction to MINLP
18		Practice session
19		Project presentations
20		Project presentations
21	Friday	Project presentations
22		Project presentations
23		Project presentations

1.5   GRADING

To be discussed with Prof. Lars Imsland.