IOWA STATE UNIVERSITY
DEPARTMENT OF MATHEMATICS

COURSE SYLLABUS - FALL 2015

MATH 566
DISCRETE OPTIMIZATION
(3 credits)

Time: 9:00am-9:50am MWF, BLACK 1034

Instructor: Bernard Lidický, 422 Carver Hall, lidicky@iastate.edu
Web page: `http://orion.math.iastate.edu/lidicky/566/`
Office hours: 10:00am - 10:50am MW
Grader: Kevin Moss, 417 Carver Hall, kmoss@iastate.edu

Brief description of goals and objectives: The main topic of the class is learning efficient ways to solve various problems from discrete mathematics, in particular graph theory. We will study linear programming, duality theory and ways of solving linear programs. Other problems include the shortest-path, minimum spanning tree, max-flow/min-cut, minimum cost flow, maximum matching. We will discuss integer linear programming and matroids. If time permits, we will cover applications of semidefinite programming.

We will learn theoretical description of the algorithms and as well as implementations. During the course, you will be asked to solve theoretical questions as well as create implementations of some of the used algorithms in sage.

Prerequisites:
Official: MATH 317 OR MATH 507 OR MATH 510.
Suggested: Basic programming skills.

Textbook:
Combinatorial Optimization - Bernhard Korte and Jens Vygen
Free PDF from ISU: `http://link.springer.com.proxy.lib.iastate.edu/book/10.1007/978-3-642-24488-9/page/1`
You can get a new printed copy from the same link for about $30 (including shipping).

Topics to be covered: Tentative plan is to covers parts of Chapters 3-11 and 13. We will not follow the book strictly.
Additional books, that may be helpful:
Understanding and Using Linear Programming - Jiří Matoušek and Bernd Gärtner
Combinatorial Optimization - William Cook, William Cunningham, William Pulleyblank, Alexander Schirjver

Study habits: This course does require considerable work. You should be devoting time to reading the book, thinking about the proofs, ideas, concepts, and techniques, talking with some of your classmates about them, doing all the assigned homework problems. It is expected that you will read the book - not everything you should learn and know will be discussed in class. Regular attendance and participation in class activities are the prerequisites for success.

Online resources: The class has a webpage `http://orion.math.iastate.edu/lidicky/566/` and a page in Blackboard. The webpage contains basic information about the class and class log, which serves as a tentative schedule of the course as well as list of what was done in class. The Blackboard contains grades as well as a forum where you can seek help. Department also maintains a general MATH 566 description `http://orion.math.iastate.edu/dept/CoursePages/566/`.

Homework assignments: The assignments will be given weekly. They will be always due Wednesday BEFORE the class begins, including the Wednesday of the dead week. The homework assignment will not cover all exercises in the chapters in the book. You are strongly encouraged to read all the exercises in the book and try to solve them. You will get the most knowledge if you try to solve as many exercises as possible. No late assignments will be accepted. If you cannot make it to class on some Wednesday, you can scan your work and email it to the instructor. Your work on any assignments should be well-presented in good English, and not written carelessly. While you can discuss the assignments with classmates, the work you hand in should be your own write-up and not copied from someone else. The homework assignments will be 45% of your final grade.

Exams: There will be two midterm exams during the semester, each worth 15% of the final grade, and a final exam, worth 25% of the final grade. Plan is to have take home exams. You are allowed to use your notes but not help of others.

I do not intend to give make-up exams for any other reasons than for excusable absences. Please check `http://www.math.iastate.edu/Faculty/ClassPolicies.html` for the university policy on "excusable absences". The only possible excuses are medical excuse, extra curricular activities as a representative of Iowa State University, armed forces deployment, or officially mandated court appearances, including jury duty. Official documentation is required in all cases.

Grading policy: Your final grade will be 45% for homework, 15% for each of the two

midterms and 25% for the final exam. Grades thresholds are 90% for A, 80% for B, 70% for C and 60% for D. Below 60% is F.

Because of this absolute standard, you are not in competition with your classmates nor does their performance influence positively or negatively your performance. You are encouraged to form study/problem groups with your classmates; things not clear to you may become obvious when you try to explain them to others or when you hear other points of view. Sometimes just verbalizing your mathematical thoughts can deepen your understanding.

As already mentioned, if you discuss with others the exercises, each person should write up her/his own version of the solution.

If you do not have a anybody in class to talk to, you are welcome to use the forum on Blackboard to ask questions. Anybody from the course can answer. Please, never post a complete solution of any homework assignment to the Blackboard.

Classroom etiquette: Communication devices must remain switched off during the class periods. Laptops, iPads or phones during the class are allowed only for textbook reading, taking notes and when instructor assigns work that require the use of laptop.

Attendance: Although attendance will not be taken, it is mandatory. Office hours are for those of you who need additional help beyond that given in the class; they are not substitutes for class.

Academic dishonesty: The class will follow Iowa State University's policy on academic dishonesty. Anyone suspected of academic dishonesty will be reported to the Dean of Students Office. `http://www.dso.iastate.edu/ja/academic/misconduct.html`

Disability accommodation: Iowa State University complies with the Americans with Disabilities Act and Sect 504 of the Rehabilitation Act. If you have a disability and anticipate needing accommodations in this course, please contact instructor to set up a meeting within the first two weeks of the semester or as soon as you become aware of your need. Before meeting with the instructor, you will need to obtain a SAAR form with recommendations for accommodations from the Disability Resources Office, located in Room 1076 on the main floor of the Student Services Building. Their telephone number is 515-294-7220 or email disabilityresources@iastate.edu. Retroactive requests for accommodations will not be honored.

Dead week: There will be a homework assignment due Wednesday of the dead week.