

## APPLICATION FOR CHANGE IN EXISTING COURSE: MAJOR & MINOR

1. Submitted by College of \_\_\_\_\_ Date \_\_\_\_\_  
Department/Division offering course \_\_\_\_\_
2. Changes proposed:
  - (a) Present prefix & number \_\_\_\_\_ Proposed prefix & number \_\_\_\_\_
  - (b) Present Title \_\_\_\_\_  
New Title \_\_\_\_\_
  - (c) If course title is changed and exceeds 24 characters (Including spaces), include a sensible title (not to exceed 24 characters) for use on transcripts:  
\_\_\_\_\_
  - (d) Present credits: \_\_\_\_\_ Proposed credits: \_\_\_\_\_
  - (e) Current lecture: laboratory ratio \_\_\_\_\_ Proposed: \_\_\_\_\_
  - (f) Effective Date of Change: (Semester & Year) \_\_\_\_\_
3. To be Cross-listed as: \_\_\_\_\_  
Prefix and Number \_\_\_\_\_ Signature: Department Chair \_\_\_\_\_
4. Proposed change in Bulletin description:
  - (a) Present description (including prerequisite(s)):  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
  - (b) New description:  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
  - (c) Prerequisite(s) for course as changed: \_\_\_\_\_
5. What has prompted this proposal?  
\_\_\_\_\_  
\_\_\_\_\_
6. If there are to be significant changes in the content or teaching objectives of this course, indicate changes:  
\_\_\_\_\_  
\_\_\_\_\_
7. What other departments could be affected by the proposed change?  
\_\_\_\_\_
8. Will changing this course change the degree requirements in one or more programs?\*  Yes  No  
**If yes, please attach an explanation of the change.\***
- 9.. Is this course currently included in the University Studies Program?  Yes  No  
**If yes, please attach correspondence indicating concurrence of the University Studies Committee.**
10. If the course is a 100-200 level course, please submit evidence (e.g., correspondence) that the Community College System has been consulted.

\*NOTE: Approval of this change will constitute approval of the program change unless other program modifications are proposed.

11. Is this a minor change?  Yes  No  
(NOTE: See the description on this form of what constitutes a minor change. Minor changes are sent directly from the Dean of the College to the Chair of the Senate Council. If the latter deems the change not to be minor, it will be sent to the appropriate Council for normal processing.)

12. Within the Department, who should be consulted for further information on the proposed course change?

Name: \_\_\_\_\_ Phone Extension: \_\_\_\_\_

**Signatures of Approval:**

|   |                                     |
|---|-------------------------------------|
| Department Chair                          | Date                                |
| Dean of the College                       | Date                                |
|   | Date of Notice to the Faculty       |
| **Undergraduate Council                   | Date                                |
| **Graduate Council                        | Date                                |
| **Academic Council for the Medical Center | Date                                |
| **Senate Council                          | Date of Notice to University Senate |

\*\*If applicable, as provided by the Rules of the University Senate.

**ACTION OTHER THAN APPROVAL**

\*\*\*\*\*

The Minor Change route for courses is provided as a mechanism to make changes in existing courses and is limited to one or more of the following:

- a. change in number within the same hundred series;
- b. editorial change in description which does not imply change in content or emphasis;
- c. editorial change in title which does not imply change in content or emphasis;
- d. change in prerequisite which does not imply change in content or emphasis;
- e. cross-listing of courses under conditions set forth in item 3.0;
- f. correction of typographical errors. [University Senate Rules, Section III - 3.1]

**Application for Change in Existing Course**  
**MA 515**

**Present description:** Mathematical and computational aspects of linear programming, large scale structures, quadratic programming, complementary pivoting, introduction to nonlinear programming. Applications to engineering and economics. Additional topics selected in geometric programming, stochastic programming. Prereq: A course in linear algebra or consent of instructor. (Same as STA 515.)

**New description:** Mathematical and computational aspects of linear programming and combinatorial optimization. Linear optimization is introduced by presenting solution techniques (primal and dual simplex) and studying geometric properties and duality for linear systems of inequalities. Basics of combinatorial optimization, including trees, paths, flows, matchings, and matroids, and the corresponding algorithms are presented. Prereq: A course in linear algebra or consent of instructor. (Same as STA 515.)

## MA 515 — Linear and Combinatorial Optimization

### Suggested Texts:

1. *Combinatorial Optimization: Theory and Algorithms* (2nd edition), B. Korte, J. Vygen, Algorithms and Combinatorics 21, Springer, 2002, ISBN 3-540-43154-3. [Chapters 1-3, 6-10 (omitting 6.4, 7.3, 8.4-8.7, 9.3, 9.5, 10.4), 13 (omitting 13.7)].
2. *Introduction to Linear Optimization*, D. Bertsimas, J.N. Tsitsiklis, Athena Scientific, 1997, ISBN 1-886529-19-1. [Chapters 2-4].
3. Linear Programming Lecture Notes, C. Lee, manuscript.

### Outline:

#### Linear Programming:

1. Linear inequalities and polyhedra.
2. Simplex methods (primal, dual).
3. Revised simplex method.
4. Duality and complementary slackness.

#### Combinatorial Optimization:

1. Spanning trees.
2. Shortest path algorithms.
3. Max-flow/min cut; Edmonds-Karp specialization of the Ford-Fulkerson algorithm; Menger's Theorem.
4. Matching theory and applications.
5. Matroids; Greedy algorithm; Matroid polytope; Maximum cardinality matroid intersection.

### Additional References:

1. *Linear Programming*, V. Chvátal, Freeman and Co., 1983, ISBN 0-7167-1195-8.
2. *Operations Research: Applications and Algorithms*, W.L. Winston, Duxbury Press, 1987, ISBN 0-87150-065-5 90-01.
3. *Integer and Combinatorial Optimization*, G.L. Nemhauser, L.A. Wolsey, Wiley, 1999, ISBN 0-471-35943-2
4. *Combinatorial Optimization: Networks and Matroids*, E.L. Lawler, Holt, Rinehart and Winston, 1976.