Washington University in St. Louis
OLIN BUSINESS SCHOOL

OMM 500N
Prescriptive Analytics
Fall 2018 Course Syllabus

1. General Information

Instructor: Lingxiu Dong
Knight Hall 443
Tel: (314)935-6336
Email: dong@wustl.edu

Office Hours: Thursdays 4:00-5:00 or by appointment.

Class Schedule:

Section 1: 11:30am - 1:00pm, Monday and Wednesday, Bauer Hall 160
Section 2: 1:00pm - 2:30pm, Monday and Wednesday, Bauer Hall 160
Section 3: 10:00am - 11:30am, Monday and Wednesday, Bauer Hall 150

Per University policy, lectures begin 10 minutes past the scheduled time.

Teaching Assistants:

Puping Jiang <jiang.p@wustl.edu>
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Administrative Assistant:

Brian Harting <harting@wustl.edu> Knight Hall 455

2. Course Description and Objectives

This course covers optimization models and tools as they apply to decision making in various functional areas. Optimization models have become an indispensable tool in addressing the type of complex problems faced today by business decision makers.

An optimization model is a mathematical representation of a real-world dilemma that helps organizations define problem scope, spell out goals, and identify constraints. The aim is to identify action(s) that achieves goals as best as possible. When used in conjunction with good managerial sense and good data, optimization analytics can deliver substantial value to organizations.

We cover the main types of optimization models: linear, integer, and non-linear programs. These models arise in a host of application areas: supply chain network design, transportation, production planning, financial portfolio investment, and pricing and revenue management models. Our focus in this course is on essentially deterministic models, but part of the methodology we cover is how to test robustness or sensitivity of our conclusions against changes in model assumptions and data. The complementary course, OMM500M, covers simulation models applicable when uncertainty features prominently.

Upon successful completion of this course, you will demonstrate competency in formulating and solving optimization models of real-life complexity using state-of-the-art software. You will become proficient with industrial-strength software optimization packages in Python, and with Excel's Solver. The course emphasizes proficiency in model-building and using software tools rather than theory. Data and implementation issues are crucial in ensuring the success of an optimization project and are discussed in the course. Examples of industry best practices are also presented.

The learning objectives of the course are:

1. Understand and practice building linear, nonlinear, and integer optimization models.
2. Exhibit competence with industrial-strength optimization tools and with Microsoft Excel Solver
3. Understand the power and limitations of optimization models. Develop the competence required to propose and evaluate Business Process Reengineering initiatives.

This course involves substantial amount of work. There are several required group projects. Each class session will involve substantial "hands-on" experience. It is essential that you attend every class meeting and that you bring your computer to every class with all required software installed.

Session	Topics	Software	Readings	Assignments Due
Mon, 22 Oct.	Linear and Nonlinear Optimization	Excel	[Baker] Ch. 1, 2, & 8	
Wed, 24 Oct.				
Mon, 29 Oct.	Network Models	Excel	[Baker] Ch. 3 & 4	Assignment 1 (Group)
Wed, 31 Oct.				
Mon, 5 Nov.	Sensitivity Analysis (virtual class) Introduction to Optimization in Python	Excel		Assignment 2 (Individual)
Wed, 7 Nov.		Python		
Mon, 12 Nov.	Multi-Period and Multi-Commodity models Mixed-Integer Programming	Python	[Baker] Ch. 6 & 7	Assignment 3 (Group)
Wed, 14 Nov.				
Mon, 26 Nov.	Supply Chain Network Design	Python	[Watson et al.] Ch. 3 & 5	Assignment 4 (Individual)
Wed, 28 Nov.				
Mon, 3 Dec.	Advanced Applications	Python/ Excel		Assignment 5 (Group)
Wed, 5 Dec.				
Final (take-home) exam due Wed, Dec 12th, at 4:00 p.m.				

3. Schedule Overview

An overview of the course schedule is given in the table below. Session-by-session readings, assignments, required class preparations, and TA sessions will be updated on Canvas.

4. Course Material

Reference Textbooks:

There is no single book that adequately covers all aspects of this course. The first book below covers optimization using Excel. The second book focuses on supply chain network optimization and various business issues from a practitioner's perspective. Copies of all books are available at the Business Library under course reserve.

Title: *Optimization Modeling with Spreadsheets*
Authors: Kenneth R. Baker
Edition: 2nd edition
ISBN-13: 978-0470928639
Chapters covered: 1-4, 6-8.

Title: *Supply Chain Network Design: Applying Optimization and Analytics to the Global Supply Chain*
Authors: Michael Watson, Sara Lewis, Peter Cacioppi, and Jay Jayaraman
Edition: 1st edition
ISBN-13: 978-0133017373
Chapters covered: Mainly Part II.

Course Packet and Handouts:

There is no course packet for this course. Lecture notes and other course material will be posted on Canvas.

A lab fee will be charged for the copyright of a case that we will use this course

Software:

The following software is required for the course.

- *Microsoft Excel 2016*
- *Python*

You should be familiar and already have access to Microsoft Excel 2016. Basic programming knowledge in python is required.

5. Assessment

	weight [%]
Group Assignments (3 assignments)	30
Individual Assignments (2 assignments)	30
Final Exam	30
Class Attendance/Participation/Pre-class Assignment	10

6. Pre-Requisites

The course has no formal pre-requisites. It is intended for students in the MS/SCM and MSA programs. Students from other Masters or undergraduate program students are required to obtain the permission of the instructor before enrolling in this course.

7. Academic Integrity

The Olin Business School is a community of individuals with diverse backgrounds and interests who share certain fundamental goals. Primary among these goals is the creation and maintenance of an atmosphere conducive to learning and personal growth for everyone in the community. Becoming a member of the Olin community is a privilege that brings certain responsibilities and expectations. The success of Olin in attaining its goals and in maintaining its reputation of academic excellence depends on the willingness of its members, both collectively and individually, to meet their responsibilities. All individuals associated with Olin should conduct themselves with the utmost integrity in all aspects of their life, both on and off campus.

As instructors, we will consistently and fully support Olin's Academic Code of Conduct and Olin's Code of Professional Conduct. We take the matters of academic integrity and professional conduct seriously and expect that you do, too. We encourage you to ask if you have any questions about academic integrity in this course. Please refer to the publication *Integrity Matters: Olin Business School Code of Conduct* for specific responsibilities, guidelines and procedures regarding academic integrity.

It is a violation of the Olin code of conduct to consult solutions from previous semesters or to work in groups larger than those specified. Electronic copies of all assignments will be submitted via Canvas using Safe-Assign.

8. Accommodations for Students with Disabilities

Accommodations will be made for students with verifiable disabilities. Students who qualify for accommodations must register through Washington University's Center for Advanced Learning Disability Resources (DR) in Cornerstone. Their staff members will assist the course instructors in arranging appropriate accommodations.