Course Description
This course is a propedeutic and informal introduction to the development and perspectives of mathematical music theory and its technology. We first motivate and unfold the conceptual framework upon the critical cases of Hugo Riemann’s rhythm theory and Rudolf Reti’s melody theory.—Music theory provides us with models of harmony, counterpoint, rhythm, or melody. What is the role of such models: a posteriori reconstruction of a historical development or construction of future directions in music? Core topics: Fux’ gradus ad parnassum and Boulez’ approach to creative analysis.—A theory and its computerized implementation are dramatically different topics. To understand the problem, we discuss the topic of programming abstract theory in the case of musical performance. The implementation of theories enables investigations with a variety of system parameters, and thereby an opening of such premises. But also a number compositional strategies, which extend the creative power and enable fictitious music worlds of the future, such as, for example, new contrapuntal paradigms. The latter is being implemented on my music software Rubato Composer, which I want to present as a perspective of future music creation.

Media and Collaboration
I do not stick to a fixed media, the emphasis being rather on the collaboratory paradigm, using music audio examples, scores, music software, powerpoint, reading texts, blackboard discourses, or the piano. I also welcome critical perspectives in the course discussions, which will take 40% of the course time.

Prerequisites
No specific prerequisites in mathematics (beyond high school education) are required. However, a basic interest for mathematical structures and information technology is advantageous.

Goals and Objectives
This course will provide the students with a first overview of the new methods of mathematical music and performance theory, music informatics, and compositional strategies. It is not the course’s goal to delve into mathematical formalism, but to give an idea of why and how these formalisms are being applied. The objective of the course is to let the students have enough specific knowledge to decide upon more specialized topics in this direction in order to shape their academic curriculum.

Grading
I grade on a scale 0-10 with 0.1 steps: 9.5-10 = A, 9-9.4 = A-, 8.5-8.9 = B+, 7.6-8.4 = B, 7-7.5 = B-, 6.5-6.9 = C; 6-6.4 = C-, 5-5.9 = D, 0-4.9 = F.
Final grade: Class participation 1/3, first paper 1/3, second paper 1/3; no final exam.
First paper due March 25, length = 12 –15 pages (double spaced),
Second paper due May 6, length = 12 –15 pages (double spaced).
Plagiarism will not be tolerated and will lead to failure.

Contact
My office hours are by appointment (room 164).
Email = mazzola@umn.edu
Web = http://www.encyclospace.org
Schedule of Classes

I. INTRODUCTION
I.1 (W Jan 23) General Organization and Syllabus
I.2 (F Jan 25) A historic-systematic introduction
I.3 (M Jan 28) The dynamic ontology of music I: Presentation
I.4 (W Jan 30) The dynamic ontology of music II: Discussion
I.5 (F Feb 01) Creative collaborations in the information age I: Classical collaboratives
I.6 (M Feb 04) Creative collaborations in the information age II: Gestural paradigms

II. CONCEPT SPACES
II.1 (W Feb 06) Case study I (rhythm): Riemann, Jackendoff-Lerdahl
II.2 (F Feb 08) Concepts and software for a theory of rhythm: The MetroRubette
II.3 (M Feb 11) The MetroRubette: Examples
II.4 (W Feb 13) Case study II (motifs): Rieti
II.5 (F Feb 15) Concepts and software for a theory of motifs: The MeloRubette
II.6 (M Feb 18) Case study III (harmonies): Riemann harmony
II.7 (W Feb 20) Concepts and software for harmony: The new HarmoRubette in Rubato Composer
II.8 (F Feb 22) Why encyclopedic concept spaces in music?
II.9 (M Feb 25) Denotators I—definition of a universal concept space and notations
II.10 (M Feb 25) Denotators II—examples
II.11 (W Feb 27) Building forms and denotators on Rubato Composer

III. MODELS
III.1 (F Mar 01) The role of models in music theory
III.2 (M Mar 04) Counterpoint models I: consonances and dissonances
III.3 (W Mar 06) Counterpoint models II: deduction of the basic rules
III.4 (F Mar 08) Exotic counterpoint worlds—introduction
III.5 (M Mar 11) Boulez’ creative analysis
III.6 (W Mar 13) The Rubato software for Boulez’ structures pour piano
III.7 (F Mar 15) Discussion

Spring Break

First paper due March 25
The first paper should present a critical discussion of the topic «Is precise conceptualization of music objects and modeling in music theory only of academic interest or also useful for musical creation?» This discussion must be based upon Parts I, II, III of the course. Make appropriate references for citations.

IV. OPERATIONALIZATION
IV.1 (M Mar 25) Playing abstract symbols: the challenge of performance theory
IV.2 (W Mar 27) Critical differences between symbols and reality—levels or creativity
IV.3 (F Mar 29) What is an instrument?

V. EXPERIMENTS
V.1 (M Apr 01) What is an experiment in music?
V.2 (W Apr 03) The sonata experiment (an example of Boulez’ approach)
V.3 (F Apr 05) Modeling tonal modulation
Second paper due May 6
Discuss the topic «What is the difference between the experiment realized by a musical creation/composition and an experiment in the sciences?». This discussion must be based upon Parts I through V of the course. Make appropriate references for citations.

V.10 (M May 06) Presentation of students’ works I
V.10 (W May 08) Presentation of students’ works II
V.10 (F May 10) Concluding discussion

Selected Original References
Boulez P: Jalons (dix ans d’enseignement au Collège de France). Bourgeois, Paris 1989
Eco U: Art and Beauty in the Middle Ages. Yale U Press 1986
Fux J J: Gradus ad Parnassum (1725). Dt. und kommentiert von L. Mitzler, Leipzig 1742
Mazzola et al.: www.rubato.org
Mazzola G: Synthesis. STToA 1001.90, Zürich 1990
Mazzola G: L’essence du bleu. Acanthus, Rüthenen 2002