CHM 710 – Topics in Chemistry Education
Learning Theory and Chemistry Education
Course Syllabus – Fall 2007
2 credits, M 5 – 7 p.m.

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COURSE OVERVIEW

This course critically examines the current status of research in the area of learning theory as it applies to chemistry education. The course is designed for graduate students in the sciences who may or may not be familiar with the theories and techniques of science education research. Throughout, the course also focuses on the application of the findings of this research to the real world environment of the classroom.

TEXTS

They're Not Dumb, They're Different by Sheila Tobias; Research Corporation, 1990.
A Chemist's Guide to Effective Teaching, by Cooper, Greenbowe, & Pienta (eds.), Prentice Hall, 2005.
How the Brain Learns (3rd ed.) by David Sousa, Corwin Press, 2006.

COURSE OBJECTIVES

- To become familiar with significant models and research questions about learning theory as applied to chemistry education.
- To develop a portfolio of laboratory experiments, demonstrations, and activities within one chemistry discipline/course that exemplifies the principles of this class.

COURSE ASSIGNMENTS

Readings. Each week we will meet to discuss articles from the research literature that discuss various models and theoretical frameworks regarding how students learn chemistry. Students are expected to come to class prepared, having carefully read the assigned text(s).

Discussion. Students are expected to actively participate in the discussion and analysis of each article every week. Students are expected to actively participate in discussion, i.e., contribute in the form of both questions and comments regarding the readings.

Students will also be required to work in pairs as lead discussants for the readings on a rotating basis throughout the semester. Lead discussants are expected to present a short summary of the reading and give their own reactions to the readings. The summary and discussion should be conducted in an interactive and interesting manner, not simply presented as a dry assembly of facts. Lead discussants will be expected to provide examples and suggest extensions of the reading(s) for inclusion in course portfolios.

Course Portfolio. Students will develop a portfolio of activities to document their learning. The portfolio will consist of lecture ideas, demonstrations, laboratory experiments, use of instructional technology, etc. that exemplify the important principles in this class. To organize the portfolio, students should select a discipline within chemistry to focus the project (e.g., biochemistry) or a target course (e.g., instrumental analysis, organometallics, etc.). Detailed guidelines for the portfolio will be developed during class.

COURSE CALENDAR

Monday	Discussion Topic
Aug. 20	Introduction to Course
Aug. 27	*They're Not Dumb, They're Different*
Sep. 3	No class – Labor Day
Sep. 10	Brain Processing (*HtBL*, Ch. 1 & 2)
Sep. 17	Learning Styles & Inventories (*CG* Ch. 3)
Sep. 24	Stages of Development and Concrete vs. Abstract Thinking (Piaget)
Oct. 1	Constructivism (Bodner) vs. Transfer Learning (*HtBL*, Ch. 4)
Oct. 8	*Class Presentations*
Oct. 15	Information Processing Model (Johnstone) & Visualization (*CG* Ch. 16) *Portfolio due (mid-term formative feedback)*
Oct. 22	Learning Cycles (*CG* Ch. 4) & Guided Inquiry (Spencer)
Oct. 29	Memory & Retention (*HtBL*, Ch. 3) vs. Meaningful Learning (Ausubel/Novak)
Nov. 5	*Class Presentations*
Nov. 12	Metacognition/Reflection (Rickey) and Higher-Level Thinking (Bloom, *HtBL* Ch. 7)
Nov. 19	Experiential Learning Theory (Kolb) and Chemistry Representations (*CG* Ch. 7)
Nov. 26	Cognitive/Ethical development (Perry) and Models (*CG* Ch. 6)
Dec. 3	*Class Presentations*

ASSESSMENT

Preparation & Participation	30%
Lead Discussant	30%
Portfolio	40%

GRADE SCALE:
90-100%=A
80-89% =B
70-79% =C
60-69% =D
59% or lower = F