UNIVERSITAS NEGERI YOGYAKARTA
F A K U L T A S M I P A

SILABI

FRM/FMIPA/063-01
18 Februari 2011

Fakultas	: Matematika dan Ilmu Pengetahuan Alam
Program Studi	: Pendidikan Matematika
Mata Kuliah/Kode	: Psychology of Mathematics Learning/PMA202
Jumlah SKS	: Teori=2; Praktek=0
Semester	: 3
Mata Kuliah Prasyarat/kode	: Psikologi Pendidikan
Dosen	: Endah Retnowati, Ph.D.

I. Course description

This lecture discusses about the application of psychology into mathematics learning. The discussions cover the basic principles of meaningful learning which includes the process of knowledge construction and automation, effective strategies of encoding and retrieval of knowledge, why some materials are difficult to understand, social-cognitive factors on learning, problem solving procedures as well as the challenges of learning mathematics problem solving.

II. Standard of Competence

This lecture is proposed to assist students understand the basic principles of meaningful learning in mathematics and the challenges students faced when learning mathematics themes.

Basic competencies can be found in the table of activities planning below.

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III. Activity planning

Tatap Muka ke	Kompetensi Dasar	Materi Pokok	Strategi Perkuliahan	Standar Bahan/Referensi Utama
1	Explain the meaning and significance of educational psychology for mathematics learning process	Introduction to psychology of mathematics learning. A brief history of associationist (behaviorist learning theory) and the cognitive era. New perspective of cognitive psychology in education	Lecturing Classroom discussion	A
2	Explain how mathematics knowledge is acquired	Information processing theory: the role of sensory and working memory in acquiring information The role of long term memory for storing knowledge	Group and whole class discussion	A
3	Distinguish types of knowledge and some conceptualizations of information stored in long term memory; and also give examples in mathematics	Types of knowledge: declarative, procedural and conditional Semantic vs. episodic memory Building block of cognition: concepts, propositions and schemata	Group and whole class discussion	A
4	Explain schema construction and automation as the main purpose of mathematics learning	Bartlett's study and Piaget's theory of schema construction How schema automation develops Significant contribution of schema automation for learning transfer	Group and whole class discussion	A
5	Explain how students encode wither simple or more complex information on mathematics	Encoding simple information: mediation, imagery and mnemonics strategies. Encoding more complex information: activating prior knowledge, guided questioning and levels of processing strategies. Metacognition.	Group and whole class discussion	A

6	Explain how students retrieve mathematics related information already stored in their memory	Retrieval processes: encoding specificity, recognition and recall, reconstruction, recalling specific events, and relearning	Group and whole class discussion	A
7	Explain some factors influencing to mathematics learning process	Self-efficacy (Social-cognitive theory of Bandura) Attributions Autonomy and control	Group and whole class discussion	A
8		Belief about intelligence Belief about knowledge	Group and whole class discussion	A
9		Vygotsky's theory: Role of classroom discourse and collaboration with peers in knowledge construction	Group and whole class discussion	
10	Demonstrate ability to answer specific questions related to how students learn mathematics	Mid-test	Individual work	Essay test
11	Explain how students solve mathematics problems	What is problem solving Problem solving procedures Difference between mathematics novice vs. expert problem solvers	Group and whole class discussion	A
12	Explain why some material are difficult to understand	Example of difficult materials in mathematics Factors contributing to difficulty in understanding a mathematics material (intrinsic and extrinsic cognitive load)	Group and whole class discussion	A
13	Draw principles of meaningful learning (Essay assignment) Explain the concept of creativity	Principles of meaningful mathematics learning Creativity	Group and whole class discussion	A, B
14	Identify the challenge of arithmetic problem solving	How students solve number representations	Group and whole class discussion	B

15	Identify the challenge of algebraic problem solving	How students solve word problems or equations	Group and whole class discussion	B
16	Identify the challenge of geometrical problem solving	How students solve geometrical problems	Group and whole class discussion	B

IV References

A. Main

[A] Bruning, R. H., Scraw, G. J., Norby, M. N., & Ronning, R. R. (2011). *Cognitive psychology and instruction* (5th ed.). Boston, MA: Pearson.
[B] National Research Council (U.S.). (2005). *How students learn: History, Mathematics and Science in the classroom.* Washington, DC: The Academic Press.

B. Additional

O'Donnell, A. M., Reeve, J. and Smith, J.K. (2009). *Educational psychology: Relection for action* (2nd ed). Hoboken, NJ: John Wiley and Sons.
Eysenck, M. W. and Keane, M. T. (2010). *Cognitive psychology: A student's handbook* (6th ed). Hove, UK: Psychology Press.
Mayer, R. (1999). *The Promise of Educational Psychology: Learning in the content areas* (Vol. 1). Upper Saddle River: NJ: Merill - Prentice Hall.
Mayer, R. (1999). *The Promise of Educational Psychology: Teaching for meaningful learning* (Vol. 2). Upper Saddle River: NJ: Merill - Prentice Hall.
Reed, S. K. (1999). *Word problems.* Mahwah, NJ: Lawrence Erlbraum Associates.
Schunk, D. H. (2012). *Learning theories: An educational perspective.* Boston, MA: Pearson.

And suggested readings during the lecture.

V Assessment

No	Component	Weight (%)
1	Classroom participation - Write summary of the lecture - Active involvement in the classroom discussion	20
2	Structured assignment (essay)	20
3	Mid test	30
4	Final test	30
Total		100

Sighted
Ketua Jurusan Pend. Matematika

Dr. Sugiman, M.Si.
NIP.

Yogyakarta, 1 September 2014
Lecturer

Endah Retnowati, Ph.D.
NIP. 19801228 200212 2 003