

**MATH 1305, MATHEMATICS FOR CRITICAL THINKING**  
*Spring Semester, 2013-14*  
Mathematics Department, Dr. Ernest Pyle, Department Chair

**COURSE DESCRIPTION**

Mathematical topics needed for the critical evaluation of quantitative information and arguments, including logic and the critical appraisal of graphs and tables including the use of some simple mathematical models and an introduction to elementary probability, statistics, and finance. This course may not be counted as part of a mathematics major or a mathematical studies major.

**COURSE SEQUENCE IN CURRICULUM**

This course may be used to fulfill the mathematics requirement for Smith College for students not majoring in math, science, engineering, or business. It may also be used to demonstrate math proficiency **provided the student earns a grade of C or higher**. It may not be counted as a part of the mathematics major.

**PRE-REQUISITE INFORMATION**

MATH 1302 or equivalent, or a satisfactory score on a departmental placement examination.

**INSTRUCTOR INFORMATION**

Name: Kelli Smith  
E-mail: ksmith@hbu.edu  
Office Phone: N/A  
Office Location: S105C  
Office Hours: Email for appointment  
Web Page Address, Web Board, ListServ: Blackboard

**LEARNING RESOURCES**

Course Text: *Think Mathematically*, 5<sup>th</sup> edition, by R. Blitzer, Prentice Hall, 2011.  
Laboratory Text: None  
Supplementary Text: None  
Other Required Materials: A non-programmable scientific or graphing calculator.

**COURSE OBJECTIVES**

Purpose of the course:

Math 1305 is an introductory level course in set theory, probability, and statistics designed to meet the mathematical needs of the liberal arts student. The purpose of this course is to expose students to topics in mathematics that are usable and relevant to any educated person. It is the desire of the university that students taking this course will encounter topics that will be useful at some time during their lives. Students are also encouraged to recognize the relevance of mathematics to a well-rounded education. This course also covers some of the topics for the Math EXECT test for teacher certification for the state of Texas.

Aims for the course:

To develop critical thinking skills that apply to mathematics and other disciplines.

On completion of this course, students should be able to:

1. to draw Venn diagrams for word problems, and to use inductive and deductive reasoning to obtain valid conclusions.
2. to convert paragraph form statements into symbolic form.
3. to construct truth tables for written statements, and to use the tables to determine the validity of statements.
4. to construct the converse, inverse, and contrapositive of statements.
5. to analyze arguments by use of truth tables.
6. to use set notation and perform basic set operations such as union, intersection, and complement.
7. to use Venn diagrams to solve problems in basic set theory.
8. to calculate combinations and permutations both by use of formulas and with a scientific calculator.
9. to understand the notion of probability and its origins.
10. to calculate probabilities using the basic rules of probability.
11. to find an expected value, and to interpret it.
12. to understand the ideas of population, sample set, and data set, and to interpret some basic tables and pie charts.
13. to calculate the mean, median, variance, and standard deviation for a data set.
14. to work with normal distribution probabilities.
15. to read and to understand polls, and to calculate margins of error for polls.
16. to calculate simple interest.
17. to calculate compound interest and annual yield.
18. to calculate the present value, future value, and payment amount for an annuity.
19. to compute mortgage payments.

#### **RELATION TO DEPARTMENTAL GOALS AND PURPOSES**

The Mathematics/Physics Department "...will offer an academically rigorous, undergraduate curriculum in classical and modern mathematics. The curriculum will prepare students majoring in mathematics and mathematical studies for careers and further education in mathematics and will encourage a lifetime of learning."

"...will provide academically rigorous and modern courses in mathematics to support other programs at the University."

"...will offer courses to enable all graduates of the University to become mathematically literate and develop useful skills in mathematics."

"...will provide the appropriate administrative processes, facilities, research experiences, and faculty to achieve the goals stated above."

#### **RELATION TO COLLEGE GOALS AND PURPOSES**

"...to prepare students for careers and further education in the natural sciences and mathematics in a nurturing Christian environment. The College will also serve the HBU community by providing science and mathematics classes that empower HBU students to meet the goals and requirements of their field of study and enrich their liberal arts education."

#### **RELATION TO THE PURPOSE STATEMENT OF THE UNIVERSITY**

University mission and purpose statement from the Houston Baptist University Catalog, 2009-2010: "...to provide a learning experience that instills in students a passion for academic, spiritual, and professional excellence as a result of our central confession, "Jesus Christ is Lord"

"...Committed to providing a responsible and intellectually stimulating environment that:

- fosters spiritual maturity, strength of character, and moral virtue as the foundation for successful living
- develops professional behaviors and personal characteristics for life-long learning and service to God and to the community
- meets the changing needs of the community and society
- remains faithful to the **‘Nature of the Institution’** statement”

“...Promotes learning, scholarship, creative endeavor, and service”.

## **ATTENDANCE**

Please see the official Attendance Policy in the HBU Classroom Policy on Blackboard. Students missing more than 25% of the class will be given a failing grade.

For this class, the penalty for each unexcused absence beyond three per semester will be one percent of the final grade. For example, if a student has an overall grade of 93, but five unexcused absences, the final grade will be 91.

An attendance sheet will be circulated at the beginning of each class, and will represent the official record for that class. It is the student’s responsibility to make sure he or she signs the attendance sheet. A tardy student may be counted absent, at the discretion of the instructor.

## **ACADEMIC ACCOMODATIONS**

Students needing learning accommodations should inform the professor immediately and consult the Academic Accommodations section of the HBU Classroom Policy posted on Blackboard.

## **COURSE REQUIREMENTS & GRADE SCALE**

**Calculators:** Scientific calculators will be allowed on some quizzes and exams, but not on others, consistent with the subject matter being tested.

**Homework:** Homework assignments will be made regularly, and represent the minimum number of problems a student should be able to solve. MyMathLab will be used for the majority of homework assignments. Problems similar to the homework will be included regularly on the quizzes. **In some instances homework will be used to introduce concepts not discussed in class.** Homework will be accepted only in the format defined by the professor.

**Quizzes:** Quizzes will be given with or without advance notice. The quizzes will cover topics from the homework problems and from example problems discussed in class.

**Exams:** Three exams and a comprehensive departmental final exam will be given. The exams will cover topics from the homework problems and from example problems discussed in class.

**Class participation:** Active participation in class is encouraged and expected.

**Questions on grading:** Questions on the grading of a quiz or exam must be raised within a week after the graded quiz or exam is returned. Otherwise, questions on grading will not be entertained.

Grading standards:

Course grading is as follows:

Quizzes and homework, combined	10%
Exams (3 at 20% each)	60%
<u>Final</u>	<u>30%</u>
TOTAL	100%

The grading scale is:

Assignment of final grade:

- A: 90% or greater
- B: 80% or greater and less than 90%
- C: 70% or greater and less than 80%
- D: 60% or greater and less than 70%
- F: less than 60%

### **PROFICIENCIES:**

#### Technology component:

Some exercises require the use of a calculator.

#### Designated essay/writing component:

Some homework problems require sentences or short paragraphs as answers. Also, students are encouraged to express their reasoning in clear and complete English as much as possible.

#### Reading component:

Students are required to read the textbook on a regular basis. They are responsible for all assigned material even if it is not covered in class.

#### Oral communication component:

Students are expected and encouraged to participate in discussions during lecture.

#### Mathematics component:

Entire course.

#### Critical thinking component:

Students are required to read, understand, and analyze problems, develop solution strategies, implement those strategies to solve the problems, then interpret and verify their results.

### **LATE WORK & TEST POLICY**

#### Late work:

Late homework will be accepted only in the event of an excused absence, and must be turned in by the second class following the student's return.

#### Missed quizzes:

No makeup quizzes will be given. Quizzes missed due to an excused absence will not be used in determining the quiz/homework average.

Missed tests:

No makeup exams will be given. The final exam grade will (also) be used to replace the grade of any one exam missed due to an excused absence. The student must contact the instructor within 24hrs of missing an exam, or the exam grade will be 0.

## **EVALUATION**

Method of student appraisal of faculty:

Students will be given an opportunity to appraise the professor by completing the IDEA Faculty Evaluation Questionnaire, and/or the COSM course evaluation at the end of the semester. The instructor, the department chairman and dean will review the responses of the students after the completion of the course.

Method of evaluating student response to course:

Students will be given an opportunity to describe their response to the course by completing the IDEA Faculty Evaluation Questionnaire and/or the COSM course Evaluation at the end of the course. The instructor, the department chairman and dean will review the responses of the students after the completion of the course.

## **LABORATORY DRESS CODE**

Students may be asked in advance to wear closed-toed shoes and long pants during certain experimental procedures.

## **LABORATORY CONDUCT AND SAFETY**

Not applicable.

## **TOPICAL OUTLINE - *include table, calendar, or topical outline with dates***

Topics Covered:

Week of 1/21/14:	1.1	Inductive and Deductive Reasoning
	2.1	Basic Set Concepts
Week of 1/27/14:	2.2	Subsets
	2.3	Venn Diagrams and Set Operations
	2.4	Set Operations and Venn Diagrams with Three Sets
Week of 2/3/14:	2.5	Survey Problems
	3.1	Statements, Negations, and Quantified Statements
	3.2	Compound Statements and Connectives
Week of 2/10/14:	3.3	Truth Tables for Negation, Conjunction, and Disjunction
	3.4	Truth Tables for the Conditional and the Biconditional
	3.5	Equivalent Statements and Variations of Conditional Statements
Week of 2/17/14:		Review / <b>Exam 1</b>
Week of 2/24/14:	3.6	Negations of Conditional Statements and De Morgan's Laws
	3.7	Arguments and Truth Tables
	3.8	Arguments and Euler Diagrams
Week of 3/3/14:	11.1	The Fundamental Counting Principle
	11.2	Permutations
	11.3	Combinations

Week of 3/10/14:	<b>Spring Break</b>
Week of 3/17/14:	11.4 Fundamentals of Probability
	11.5 Probability with Fundamental Counting Principle, Permutations, and Combinations
Week of 3/24/14:	11.6 Events Involving <i>Not</i> and <i>Or</i> ; Odds
	11.7 Events Involving <i>And</i> ; Conditional Probability
	11.8 Expected Value
Week of 3/31/14:	Review/ <b>Exam 2</b>
Week of 4/7/14:	12.1 Sampling, Frequency Distributions, and Graphs
	12.2 Measures of Central Tendency
	12.3 Measures of Dispersion
Week of 4/14/14:	12.4 The Normal Distribution
	12.5 Problem Solving with the Normal Distribution
Week of 4/21/14:	13.1 Mathematical Systems
	13.2 Rotational Symmetry, Groups, and Clock Arithmetic
Week of 4/28/14:	Review / <b>Exam 3</b>
Week of 5/5/14:	Review for Final

The content of this outline and the attached schedule are subject to change at the discretion of the professor.

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Student Signature – I have read and understand the syllabus for this class. I understand that the content of this syllabus and the topical outline are subject to change at the discretion of the professor. I have read and understand the HBU Classroom Policy posted on Black Board. **I promise to uphold the Code of Academic Integrity at Houston Baptist University and will not tolerate its violation by others.**