Math 325 Syllabus

Course title and number	**MATH 325, Sections 501 and 502**
Term	Fall 2019
Class times and location	Section 501: Tues and Thurs, 12:45pm-2:00pm in BLOC 117
	Section 502: Tues and Thurs, 2:20pm-3:35pm in BLOC 117

Instructor Information

Name	**Heather Ramsey**
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Office hours	Mon 10:00am-11:00am in BLOC 241B
	Wed 2:20pm-4:20pm in BLOC 241B

Course description and Prerequisites

Description: *The Mathematics of Interest.* (Credit 3) The mathematical theory associated with interest; annuities; varying annuities; sinking funds and amortization; coupon bonds; valuation of noncallable bonds; yield to maturity; yield curve; spot rates and forward rates; internal rate of return; duration and convexity; portfolio immunization

Prerequisites: MATH 142, MATH 147, MATH 151, or MATH 171

Learning Objectives

Students in this course will:

- Understand and be able to solve problems involving the time value of money.
- Develop quantitative and problem-solving skills, especially pertaining to interest theory.
- Be able to determine and appropriately apply various measurements of interest and discount.
- Understand and be able to solve problems involving annuities, amortization, and sinking funds and recognize the theoretical relationship between amortization and sinking funds.
- Be able to calculate bond prices and yield rates for noncallable and callable bonds and for coupon bonds and zero coupon bonds.
- Understand and be able to calculate and apply the term structure of interest rates to investment portfolios.
- Understand and be able to calculate duration and convexity as it applies to investment portfolios.
- Be able to analyze an investment portfolio to determine whether it satisfies immunization criteria.

Textbook and/or Resource Material

- **Required Textbook:** *The Theory of Interest*, 3rd Edition, by Kellison, 2009 (special edition prepared by McGraw Hill Education), ISBN: 9781307242157. Students will be expected to read the textbook sections before they are covered in lecture. A tentative lecture schedule can be found at the end of this handout. Also, suggested homework assignments will come from this textbook.

- **Required Calculator:** All students are required to have one of the following two financial calculators: BA II Plus or BA II Plus Professional Edition. While students will be allowed to use other non-CAS calculators (for example, the TI-84 is ok, but the TI-89 is not), please note that I will not give instructions how how to use these other types of calculators. In addition, most scientific and graphing calculators do not have the same built-in functionality as a financial calculator, so students without the BA II Plus or BA II Plus Professional may find themselves at a disadvantage. Students will be allowed to use two approved calculators during exams and quizzes. If you plan to take Exam FM, then these two calculators should be the BA II Plus (Professional or

regular) AND the TI-30XS *Multiview*. Any graphing calculators used must be reset before each exam or quiz–no exceptions.

- **Required Computer Access:** All students are required to purchase access to WebAssign to complete online homework for this course.

GRADING POLICIES

The course grading will be based on the results of homework, quizzes, two midterm exams, and one final exam.

- **Ungraded Homework:** Mathematics cannot be learned and fully understood by simply watching someone else do it. It must be practiced by working many, many problems. To this end, you should work all problems in your textbook that correspond to the sections covered during lecture (with occasional exceptions, which will be noted in lecture). These problems will not be collected for a grade, but completing them is essential to doing well in the course. If even more practice problems are needed, please visit the Society of Actuaries' website to find Exam FM practice problems. If you intend to sit for Exam FM, you should also consider purchasing a study manual.

- **Graded Homework:** Graded homework assignments will be completed online in WebAssign. Please go to https://www.webassign.net/tamu/login.html to log in to WebAssign, and then you will need to enter the following class key: **tamu 4239 5389**. Please note that this homework, while graded and applied toward your course grade, is NOT a comprehensive set of problems in terms of preparing for exams and quizzes. To be fully prepared for exams and quizzes, you are expected to complete all of the ungraded homework from your textbook and any additional practice problems that I post in eCampus. Most students find the problems in WebAssign to be very challenging. Because of this, I recommend that you rework all examples from the lecture notes first and then work all problems from the textbook (found at the end of each chapter, broken down by section) before attempting the problems in WebAssign.

- **Quizzes:** Announced and unannounced in-class and take-home quizzes may be given throughout the semester.

- **Exams:** Exams 1 and 2 are tentatively scheduled for the dates indicated below. These dates (except for the final exam) are very much subject to change; it will depend on how we are progressing through the material. At least one week of notice will be given if a date does change. *Exam 2 and the final exam are comprehensive.*

- **Exam Timeline:**

Activity	Date	Percent of Final Grade
Exam I	Tues., Oct. 1	20%
Exam II	Thurs., Nov. 7	25%
Quizzes & Homework	Weekly	25%
Final Exam	Section 501: Dec. 11, 8am-10am	30%
	Section 502: Dec. 11, 1pm-3pm	
TOTAL		**100%**

- **Grading Scale**

Range	Grade
final avg $\geq 90\%$	A
$80\% \leq$ final avg $< 90\%$	B
$70\% \leq$ final avg $< 80\%$	C
$60\% \leq$ final avg $< 70\%$	D
final avg $< 60\%$	F

- **Attendance:** Attendance is required in this class. All students are expected to arrive on time and be ready to actively participate in lecture every day. I STRONGLY suggest that you make every attempt to not miss a single day of lecture. Falling behind in this course can be very detrimental to your grade. Attendance will be used in conjunction with your final exam grade as a consideration in the case of borderline grades.

- **Make-up Policy:** No make-ups will be given without written evidence of an official University excused absence. (See *University Student Rules*.) According to Section 7.3 of the *University Student Rules*, for an absence to be considered excused,

  > the student must notify his or her instructor in writing (acknowledged e-mail message is acceptable) prior to the date of absence if such notification is feasible. In cases where advance notification is not feasible (e.g. accident or emergency) the student must provide notification by the end of the second working day after the absence. This notification should include an explanation of why notice could not be sent prior to the class.

  If no such notice is given, the rights to a make-up are forfeited. In addition (and also in accordance with *University Student Rules*), a **written** excuse must be presented upon return to class. Specifically, in the case of illness or injury, students are required to obtain a confirmation note from a health care professional affirming date and time of a medical office visit regarding the illness or injury. I will NOT accept the Explanatory Statement for Absence from Class form as sufficient written documentation of an excused absence.

Americans with Disabilities Act (ADA)
The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please contact Disability Services, currently located in the Disability Services building at the Student Services at White Creek complex on west campus or call 979-845-1637. For additional information visit http://disability.tamu.edu/

Academic Integrity
You are encouraged to work together on the homework assignments, but do not copy another student's work. Copying work done by others, whether in class or out of class, is an act of scholastic dishonesty and will be prosecuted to the full extent allowed by University policy. Always abide by the Aggie Code of Honor: *An Aggie does not lie, cheat, or steal or tolerate those who do.* Please refer to Honor Council Rules and Procedures at http://www.tamu.edu/aggiehonor for more information on academic integrity and scholastic dishonesty. **I have served as a member of the Aggie Honor Council, so I take these matters very seriously.**

Copyright Policy
All printed materials including (but not limited to) handouts, quizzes, exams, and information found on the web are protected by copyright laws. One xerox copy (or download from the web) is allowed for personal use. Multiple copies or the sale of any of these materials is strictly prohibited and will be prosecuted to the full extent of the law.

Other Course Policies

- **Email Policy:** Check your TAMU email account and eCampus announcements regularly. You are responsible for any information I send via email and/or post on eCampus. If you send an email to me, be sure to include your full name and Math 325 in the message.

- **Cell Phone/Laptop Computer Policy:** As a courtesy to me and your classmates, all cell phones and laptop computers (and other electronic devices other than approved calculators) must be OFF and put away during lecture. If you disrupt class or distract your neighbor with your cell phone or other electronic device, you may be asked to leave class.

Extra Help

- **Your Instructor:** I want each and every one of my students to be successful in this class. Please feel free to ask questions in class. If you need more help, come by my office during office hours or make an appointment to see me. Remember, I am here to help, but I cannot do that if I don't know that there is a problem.

- **Your Classmates:** Get to know your classmates. Form study groups and/or utilize the discussion board within eCampus to help each other out on the homework assignments.

- **Practice:** The best way to prepare for quizzes and exams is to practice, practice, practice, and then practice some more. I strongly recommend that you practice problems **DAILY**. If you find that you struggle with certain problems the first time you work them, be sure to work them again AND work other problems that are similar.

- **SOA's Exam FM Practice Problems:** The Society of Actuaries has compiled a set of more than 200 practice problems, most of which you will find helpful for our class. These problems can be found at https://www.soa.org/Files/Edu/2017/exam-fm-sample-questions.pdf. Also, the SOA has an online, timed practice test for FM that will be helpful when preparing for the final exam and/or Exam FM.

Title IX and Statement on Limits to Confidentiality

Texas A&M University and the College of Science are committed to fostering a learning environment that is safe and productive for all. University policies and federal and state laws provide guidance for achieving such an environment. Although class materials are generally considered confidential pursuant to student record policies and laws, University employees–including instructors–cannot maintain confidentiality when it conflicts with their responsibility to report certain issues that jeopardize the health and safety of our community. As the instructor, I must report (per Texas A&M System Regulation 08.01.01) the following information to other University offices if you share it with me, even if you do not want the disclosed information to be shared:

- Allegations of sexual assault, sexual discrimination, or sexual harassment when they involve TAMU students, faculty, or staff, or third parties visiting campus.
- Any other civil rights violation.

These reports may trigger contact from a campus official who will want to talk with you about the incident that you have shared. In many cases, it will be your decision whether or not you wish to speak with that individual. If you would like to talk about these events in a more confidential setting, you are encouraged to make an appointment with the Student Counseling Service (https://scs.tamu.edu/).

Students and faculty can report non-emergency behavior that causes them to be concerned at http://tellsomebody.tamu.edu.

COURSE TOPICS (TENTATIVE WEEKLY SCHEDULE)

WEEK	TOPIC	REQUIRED READING
1	Accumulation and amount functions, effective rate of interest, simple and compound interest, present value, effective rate of discount.	Sections: 1.2-1.7
2	Nominal rates of interest and discount, forces of interest and discount, varying interest, recognition of inflation and the real rate of return.	Sections: 1.8-1.10, 9.4
3	Equations of value; basic interest problems with unknown time, unknown rate of interest, or unknown time period; practical examples.	Sections: 2.1-2.7
4	Annuity-immediate, annuity-due, annuity values on any date, perpetuities, annuity problems with unknown time or unknown rate of interest.	Sections: 3.1-3.7
5	Annuities with varying interest, annuities with differing payment and interest conversion periods.	Sections: 3.8, 4.1-4.4
6	**Exam 1 covering Chapters 1-3 and Section 9.4**; Continuous annuities, payments varying in arithmetic progression, payments varying in geometric progression, more general varying annuities.	Sections: 4.5-4.8
7	Continuous varying annuities, introduction to loans, finding the outstanding loan balance, amortization schedules, sinking funds.	Sections: 4.9-5.4
8	Differing payment periods and interest conversion periods, introduction to bonds and other types of securities, price of a bond, premium and discount.	Sections: 5.5, 6.1-6.4
9	Bond valuation between coupon dates, determination of yield rates, callable and putable bonds, other securities.	Sections: 6.5-6.7, 6.10
10	Introduction to yield rates, discounted cash flow analysis, uniqueness of the yield rate, reinvestment rates, interest measurement of a fund, dollar-weighted rate of return.	Sections: 7.1-7.5
11	**Exam 2 covering Chapters 1-6, with an emphasis on Chapters 4-6**; Time-weighted rates of return, portfolio methods and investment year methods.	Sections: 7.6-7.7
12	Introduction to term structure of interest rates, yield curves, spot rates and their relationship with bond yields, forward rates.	Sections: 10.1-10.5
13	Duration, convexity, analysis of portfolios	Sections: 11.1-11.3, 11.5
14	Matching assets and liabilities, immunization, full immunization	Sections: 11.6-11.8
15	Catch up and review	
15/16	**Final Exam covering all material from the semester, with an emphasis on Chapters 7, 10, and 11**	