FINA 5350: Mathematical Finance  
Fall 2020

Instructor Information

Instructor  
John D. Diltz

Office Number  
Business Building Room 619

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(817) 272-3705

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diltz@uta.edu

Faculty Profile  
https://mentis.uta.edu/explore/profile/john-diltz

Office Hours  
By appointment.

Course Information

Section Information  
FINA 5350-001 and FINA 5350-900 (merged)

Time and Place of Class Meetings  
Thursdays 7:00 – 9:50 pm online via Microsoft Teams or (Plan B) Canvas Conferences

Description of Course Content  
Intensive review of the mathematics necessary for graduate work in finance, with application to selected areas of business finance, investment analysis, and financial markets. Prerequisite: FINA 5311.

Student Learning Outcomes  
1. Demonstrate knowledge of deterministic calculus principles.  
2. Find the arbitrage-free value for a contingent claim in the binomial model.  
4. Determine whether a stochastic process is a martingale.  
5. Derive the Black-Scholes partial differential equation.  
6. Derive the Black-Scholes European call option pricing model.

Required Textbooks and Other Course Materials  

Descriptions of major assignments and examinations  
Three problem sets (worked at home; see Course Schedule for assignment and due dates) and a cumulative final exam.
Technology Requirements
Computer and high-speed internet access, the Canvas Learning Management System, Microsoft Teams, the Microsoft Office Suite, and possibly (depending on time constraints), R, and RStudio (R and RStudio are open source, and installation instructions will be given in class).

Grading Information

Grading
Grades will be issued based upon a weighted average of your performance on following assignments, with the corresponding weights:

- Problem Set #1: 25%
- Problem Set #2: 25%
- Problem Set #3: 25%
- Final Exam: 25%

Your overall course average will be mapped to the following letter grades:

- 90.00 – 100.00: A
- 80.00 – 89.99: B
- 50.00 – 79.99: C
- < 50: D

Course Schedule (Subject to change at the instructor’s discretion)

<table>
<thead>
<tr>
<th>Date</th>
<th>Topic</th>
<th>Textbook Chapter</th>
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<tbody>
<tr>
<td>Aug. 27</td>
<td>Course Introduction and Calculus Review I and II</td>
<td>1, PowerPoints</td>
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<tr>
<td>Sep.  3</td>
<td>Calculus Review III and IV</td>
<td>PowerPoints</td>
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<td>Sep.  10</td>
<td>Calculus Review V</td>
<td>PowerPoints</td>
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<td>Sep. 17</td>
<td>The Binomial Arbitrage-Free Pricing Model – <strong>Problem Set 1 Assigned</strong></td>
<td>2</td>
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<tr>
<td>Sep. 24</td>
<td>Binomial Pricing Proofs and Exercises</td>
<td>2</td>
</tr>
<tr>
<td>Oct.  1</td>
<td>Advanced Mathematics Review – <strong>Problem Set 1 Due</strong></td>
<td>Appendices</td>
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<td>Oct.  8</td>
<td>Stochastic Integrals and The Ito Calculus</td>
<td>4</td>
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<tr>
<td>Oct. 15</td>
<td>Ito Calculus Examples and Applications – <strong>Problem Set 2 Assigned</strong></td>
<td>4</td>
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<td>Oct. 22</td>
<td>Differential Equations and the Feynman-Kac Theorem</td>
<td>5</td>
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<td>Oct. 29</td>
<td>Portfolio Dynamics – <strong>Problem Set 2 Due</strong></td>
<td>6</td>
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<tr>
<td>Nov.  5</td>
<td>The Black-Scholes Partial Differential Equation</td>
<td>7</td>
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<td>Nov. 12</td>
<td>The Black-Scholes Option Pricing Model – <strong>Problem Set 3 Assigned</strong></td>
<td>7</td>
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<td>Nov. 19</td>
<td>Parity Relations and Delta Hedging</td>
<td>9</td>
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<td>Nov. 26</td>
<td>NO CLASS</td>
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<td>Dec.  3</td>
<td>American Options – <strong>Problem Set 3 Due</strong></td>
<td>21</td>
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<td>Dec. 10</td>
<td><strong>CUMULATIVE FINAL EXAM</strong></td>
<td>Synchronous</td>
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Institution Information

UTA students are encouraged to review the below institutional policies and informational sections and reach out to the specific office with any questions. To view this institutional information, please visit the Institutional Information page (https://resources.uta.edu/provost/course-related-info/institutional-policies.php) which includes the following policies among others:

- Drop Policy
- Disability Accommodations
- Title IX Policy
- Academic Integrity
- Student Feedback Survey
- Final Exam Schedule

Additional Information

Mandatory Face Covering Policy
All students and instructional staff are required to wear facial coverings while they are on campus, inside buildings and classrooms. Students that fail to comply with the facial covering requirement will be asked to leave the class session. If students need masks, they may obtain them at the Central Library, the E.H. Hereford University Center’s front desk or in their department. Students who refuse to wear a facial covering in class will be asked to leave the session by the instructor, and, if the student refuses to leave, they may be reported to UTA’s Office of Student Conduct.

Attendance
At The University of Texas at Arlington, taking attendance is not required but attendance is a critical indicator of student success. Each faculty member is free to develop his or her own methods of evaluating students’ academic performance, which includes establishing course-specific policies on attendance. However, while UT Arlington does not require instructors to take attendance in their courses, the U.S. Department of Education requires that the University have a mechanism in place to mark when Federal Student Aid recipients “begin attendance in a course.” UT Arlington instructors will report when students begin attendance in a course as part of the final grading process. Specifically, when assigning a student a grade of F, faculty report must the last date a student attended their class based on evidence such as a test, participation in a class project or presentation, or an engagement online via Canvas. This date is reported to the Department of Education for federal financial aid recipients.

Important! Be sure that you include this section on attendance, even if you do not track attendance or factor attendance into the grade. It is important that students understand that any attendance rules applied in your course are your own and not a matter of institutional policy. Doing so will keep the University in compliance with Federal regulations as they apply to Title IV funding. If you are teaching a course in which attendance / hours must be tracked to meet other non-institutional requirements (e.g., to earn an academically-grounded professional credential), be sure to clearly indicate the agency that has established the requirement.

Emergency Phone Numbers

In case of an on-campus emergency, call the UT Arlington Police Department at 817-272-3003 (non-campus phone), 2-3003 (campus phone). You may also dial 911. Non-emergency number 817-272-3381

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