

## ENME 812 – Advanced Estimation Theory, Winter 2016

Department of Mechanical Engineering

<b>Lecture Details</b>	Monday through Thursday, 10:00 am to 1:10 pm Engineering Building, Room 231						
<b>Instructor</b>	Name: S. Andrew Gadsden, Ph.D., P.Eng., P.M.P. Office: ENGR 225C Hours: Following Lecture and By Request Phone: 410-455-3307 Email: <a href="mailto:gadsden@umbc.edu">gadsden@umbc.edu</a>						
<b>Course Objectives</b>	<ol style="list-style-type: none"> <li>1. Provide a theoretical understanding of advanced state and parameter estimation theory, including but not limited to: linear and nonlinear models, system and measurement noise distributions, observers, optimal filters, and robust filters.</li> <li>2. Design, build, simulate, and test estimation algorithms using both MATLAB and Simulink.</li> <li>3. Work on an estimation-based project related to graduate, thesis, or industry problems.</li> </ol>						
<b>Textbook(s)</b>	<p>Required: <i>Kalman Filtering: Theory and Practice Using Matlab</i> by Mohinder S. Grewal and Angus P. Andrews (<a href="#">2008</a>). ISBN-10: 0470173661. ISBN-13: 9780470173664.</p> <p>References: <i>Applied Optimal Estimation</i> by Arthur Gelb (<a href="#">1974</a>). ISBN-10: 0262570483. ISBN-13: 9780262570480.</p> <p><i>Optimal State Estimation</i> by Dan Simon (<a href="#">2006</a>). ISBN-10: 0471708585. ISBN-13: 8601403462680.</p>						
<b>Course Description</b>	<p>This graduate-level course is intended to provide a solid foundation in the area of estimation theory. The following concepts will be considered:</p> <ul style="list-style-type: none"> <li>• Linear and nonlinear models, dynamics, and phenomenon</li> <li>• Optimal filters and predictors</li> <li>• Kalman-based filtering</li> <li>• Robust estimation and filtering strategies</li> <li>• Nonlinear applications</li> </ul>						
<b>Grading Policy</b>	<p>The interim and final course grades will be based on the following approximate grade weights and breakdowns.</p> <table border="0" style="margin-left: auto; margin-right: auto;"> <tr> <td>Assignments</td> <td style="text-align: right;">30%</td> </tr> <tr> <td>Midterm Exam (Take-Home)</td> <td style="text-align: right;">30%</td> </tr> <tr> <td>Project Report and Presentation</td> <td style="text-align: right;">40%</td> </tr> </table>	Assignments	30%	Midterm Exam (Take-Home)	30%	Project Report and Presentation	40%
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**Policies and Procedures**

- i) Assignments must be submitted **individually**, however students are **encouraged to work together** to solve problems.
- ii) Assignments are due before lecture on the day that they are due as per the schedule. The work is due on time. No late work will be accepted. Late work will be assigned a grade of zero.
- iii) The class midterm is a take-home examination. Each student must complete the examination **individually**, and not collaborate with others.
- iv) Follow the latest project report guidelines on Blackboard. Content is most important, however grammar, spelling, and so forth, are also considered.

**Collaboration Policy**

Assignments may be collaborative, however must be submitted individually. The midterm examination and project are to be done individually.

**Schedule**

A schedule of content will be provided the first day of class. Please note the most up-to-date schedule can be found online.

**Academic Integrity**

By enrolling in this course, each student assumes full responsibility as a participant in UMBC's scholarly community in which everyone's academic work and behavior are held to the highest standards of honesty. Cheating, fabrication, plagiarism, and helping others to commit these acts are all forms of academic dishonesty. Academic misconduct could result in disciplinary action that may include, but is not limited to, a grade of zero on the particular work, a grade of F in the class, suspension, or dismissal. Please refer to the full student academic conduct policy for more information.

**Syllabus Note**

Please note that this course syllabus is subject to change. The most recent version is available on the course website (Blackboard).