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| **Course** | ECE 58900 - State Estimation and Parameter Identification of Stochastic Systems |
| **Type of Course** | Graduate Course |
| **Catalog Description** | Introduction to point estimation, least squares, Bayes risk, and maximum likelihood. Optimum mean-square recursive estimation for non-dynamic stochastic systems. State estimation for discrete-time and continuous-time dynamic systems. Parameter identification of stochastic systems using maximum livelihood. Stochastic approximation, least squares, and random search algorithms. |
| **Credits** | Cr. 3, Dual Level, Undergraduate-Graduate |
| **Prerequisite Courses** | ECE 30200 |
| **Corequisite Courses** | None |
| **Prerequisites by Topics** | Linear algebra, discrete-time systems, random process. |
| **Textbook** | *An Introduction to Identification*, J. P. Norton, Dover Publications, 2009. |
| **Course Objectives** | To provide students with an introduction to fundamental topics in system identification and linear estimation. |
| **Course Outcomes** | Students who successfully complete this course will have demonstrated:   1. An ability to model LTI systems for the purpose of identification 2. An understanding of nonparametric time domain methods of system identification 3. An understanding of nonparametric frequency domain methods of system identification 4. An understanding of parameter estimation methods 5. An insight into the properties of various identification methods in terms of their convergence and consistency 6. A familiarity with various recursive estimation methods |
| Mapping between course outcomes to program student learning outcomes   |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | | Course Outcome | Program Student Learning outcome | | | | | | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | | a | x |  |  |  |  |  |  | | b | x |  |  |  |  |  |  | | c | x |  |  |  |  |  |  | | d | x |  |  |  |  |  |  | | e | x |  |  |  |  |  |  | | f | x |  |  |  |  |  |  | | Assessment Level\* | H |  |  |  |  |  |  |   \* H: Outcome assessed with high degree; M: Outcome assessed with medium degree; L: Outcome assessed with low degree | |
| **Lecture Topics** | 1. Models of LTI systems 2. Nonparametric time domain methods 3. Nonparametric frequency domain methods 4. Parameter estimation methods 5. Convergence and consistency 6. Recursive estimation methods |
| **Computer Usage** | High |
| **Laboratory Experience** | None |
| **Design Experience** | Low |
| **Coordinator** | Hossein M. Oloomi, Ph.D. |
| **Date** | 10/01/2018 |

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| **Changes made** | 1. Textbook 2. Course outcomes added 3. Table added 4. Lecture topics added 5. Design experience changed from medium to low 6. Date |