**Global Learning Initiatives Program Course Syllabus**

**Course Information**

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| Course Name | Analytical Methods in Engineering |
| Lecturer(s) | Prof. Hyung Gyu Park |
| Course Description | This course aims at enhancing students’ ability to handle various engineering problems analytically. The course concentrates on solution methods and often relevant physical interpretations of the results.  The course comprises three parts:  (I) LINEAR ALGEBRA,  (II) ORDINARY DIFFERENTIAL EQUATIONS, and  (III) PARTIAL DIFFERENTIAL EQUATIONS.  Reading material for the lecture will be distributed at the beginning of each part (or more frequently).  Homework assignments will be graded and take up 60% of the entire grade. The final examination, which takes up 40% of the entire grade, will be taken at the end of the semester. |
| Course Objectives | Upon successful completion of the course, students can handle physical phenomena encountered in engineering, by analytical use of Linear Algebra, Ordinary Differential Equations, and Partial Differential Equations. |
| Suggested Prerequisites  (if any) | Any courses that cover Calculus and Linear Algebra at an undergraduate level |
| Reading List  (if any) | 1. T.H. Kwon, Lecture Note "Analytical Methods in Engineering"(modified & selected version of M.J. Lee's Lecture note), 1992 (To be distributed in the lecture.)  2. Any undergraduate-level textbooks on Calculus and Linear Algebra: for example, Advanced Engineering Mathematics by Erwin Kreyszig, 2011 |
| Grading Criteria | Homework: 60%;  End-of-Semester Final Examination: 40% |

**Course Schedule**

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| Class | Date (YYYY/MM/DD) | Course Topic | Lecturer |
| 1 | Week 1 | *Linear algebra: Introduction* | *Prof. H. G. Park* |
| 2 | Week 2 | *Eigenvalues and Eigenvectors* | *Prof. H. G. Park* |
| 3 | Week 3 | *Canonical Form of a Matrix, Similarity Transformation* | *Prof. H. G. Park* |
| 4 | Week 4 | *Principal Axis Transformation, Hermitian Matrix* | *Prof. H. G. Park* |
| 5 | Week 5 | *Invariants, Functions of Matrices* | *Prof. H. G. Park* |
| 6 | Week 6 | *Ordinary Differential Equations: Introduction* | *Prof. H. G. Park* |
| 7 | Week 7 | *Eigenfunction Expansion* | *Prof. H. G. Park* |
| 8 | Week 8 | *Sturm-Liouville Problem* | *Prof. H. G. Park* |
| 9 | Week 9 | *Method of Green's Functions* | *Prof. H. G. Park* |
| 10 | Week 10 | *Method of Green's Functions* | *Prof. H. G. Park* |
| 11 | Week 11 | *Partial Differential Equations: Eigenvalue Problems by Separation Of Variables* | *Prof. H. G. Park* |
| 12 | Week 12 | *Solution of PDEs by Eigenfunction Expansions* | *Prof. H. G. Park* |
| 13 | Week 13 | *Removal of Inhomogeneity from PDE* | *Prof. H. G. Park* |
| 14 | Week 14 | *Similarity Method for Self-Similar Solutions of PDE* | *Prof. H. G. Park, T.A.* |

\* schedule subject to change when necessary upon Lecturer’s decision.