



Student Name: \_\_\_\_\_

Advisor Signature: \_\_\_\_\_ BU ID \_\_\_\_\_

MS (Non-Thesis) students must take 32 credits, all of which must be at the 500 level or higher. The coursework requirements for the MS (Non-Thesis) are as follows: **Core** (3 courses), **Concentration** (2 courses), and **Elective** (3 courses). Among the 32 credits, the **Practicum Requirement** is satisfied by up to two courses from the approved list. Electives are chosen, with advisor approval, to meet an individual student's academic needs. MS students must also satisfy the advanced technical course requirement by taking at least two 700-level or higher courses from the Systems courses below, on the reverse, or courses approved by the Systems Engineering Graduate Committee in advance. MS students must maintain a cumulative GPA of 3.00 to remain in good academic standing and to graduate. Grades of "C-" or lower are not acceptable for the MS degree.

**NOTE:** Courses are color coded to indicate when they are usually offered, in **Fall**, **Spring**, **either semester** (subject to change). Courses may be offered every other year.

**CORE** Select one course from each of the following three Core areas (12 credits).

- A. **SE/EC/ME 501 Dynamic Systems Theory**, or **SE/EC/ME 710 Dynamic Programming and Stochastic Control** Semester/Grade \_\_\_\_\_
- B. **SE/EC 524 Optimization Theory and Methods** Semester/Grade \_\_\_\_\_
- C. **SE/ME 714 Adv Stoch Modeling and Sim**, or **EC 505 Stoch Processes**, or **EK 500 Probability with Statistical Applications** Semester/Grade \_\_\_\_\_

**CONCENTRATION** Select two courses from one Concentration area (8 credits).

**A. Computational and Systems Biology**

- ENG BE 505 Molecular Bioengineering I
- ENG BE 561 DNA and Protein Sequence Analysis
- ENG BE 562 Computational Biology: Genomes, Networks, Evolution
- ENG BE 567 Nonlinear Dynamics in Biological Systems
- ENG BE 747 Adv. Signals and Systems Analysis for Biomedical Eng
- ENG BE 760 Structural Bioinformatics
- ENG BE 767 Protein and Genomic Systems Engineering
- ENG BE 777 Computational Genomics I

**B. Control Systems**

- ENG SE/EC/ME 501 Dynamic Systems Theory
- ENG ME/MS 507 Process Modeling and Control
- ENG ME 560 Precision Machine Design and Instrumentation
- ENG ME 570 Robot Motion Planning
- ENG SE/EC/ME 701 Optimal and Robust Control
- ENG EC 702 Recursive Estimation and Optimal Filtering
- ENG SE/ME 704 Adaptive Control
- ENG SE/ME/EC 710 Dynamic Programming and Stochastic Control
- ENG SE/EC/ME 733 Discrete Event and Hybrid Systems
- ENG SE/ME/EC 734 Hybrid Systems
- ENG SE/ME 740 Vision Robotics and Planning
- ENG SE/ME 762 Nonlinear Systems and Control

**C. Energy and Environmental Systems**

- CAS EC 513 Game Theory (both semesters)
- ENG ME 533 Energy Conversion
- ENG SE/EC/ME 543 Sustainable Power Systems
- ENG ME/MS 545 Electrochemistry of Fuel Cells and Batteries
- CAS EC 571 Energy and Environmental Economics
- CAS EC 572 Public Control of Business
- ENG EC/MS 573 Solar Energy Systems
- GRS GE 712 Regional Energy Modeling
- GRS EC 716 Game Theory
- GSM OM 845 Clean Technology Business Models

**D. Network Systems**

- ENG EC 541 Computer Communication Networks
- ENG SE/EC/ME 544 Networking the Physical World
- ENG EC 715 Wireless Communications
- ENG SE/EC/ME725 Queuing Systems
- ENG SE/EC 741 Randomized Network Algorithms
- ENG EC 744 Mobile Ad Hoc Networking and Computing
- ENG SE/ME 755 Communication Networks Control

**E. Operations Research**

- ENG EC 503 Learning from Data
- ENG ME/EC 514 Simulation
- ENG SE/EC/ME 710 Dynamic Programming and Stochastic Control
- ENG SE/ME 714 Advanced Stochastic Modeling and Simulation
- ENG SE/EC/ME 724 Advanced Optimization Theory and Methods
- ENG SE/EC/ME 725 Queuing Systems
- ENG SE/EC/ME 732 Combinatorial Optimization and Graph Algrthms
- ENG SE/EC/ME 733 Discrete Event and Hybrid Systems
- ENG SE/ME 766 Advanced Scheduling Models and Methods

**F. Production and Service Systems**

- ENG ME 510 Production Systems Analysis
- ENG ME 518 Product Quality
- ENG SE/EC/ME 543 Sustainable Power Systems
- ENG SE/EC/ME 733 Discrete Event and Hybrid Systems
- ENG SE/ME 765 Production System Design
- ENG SE/ME 766 Advanced Scheduling Models and Methods
- GSM OM 726 Creating Value Through Operations and Technology
- GSM OM 854 Supply Chain Management

Concentration/Course/Semester/Grade \_\_\_\_\_

Concentration/Course/Semester/Grade \_\_\_\_\_

**ELECTIVE** Select 3 courses from the Concentrations listed above, if not used to satisfy the Concentration Requirement; from the other Suggested Electives listed on the reverse; or no more than one Engineering Management Course from the approved list (12 credits).

Course/Sem/Grade \_\_\_\_\_ Course/Sem/Grade \_\_\_\_\_

Course/Sem/Grade \_\_\_\_\_

**PRACTICUM** Indicate up to two courses (8cr), from the approved list on the next page, used to satisfy Core, Concentration, or Elective requirements.

Course/Sem/Grade \_\_\_\_\_ Course/Sem/Grade \_\_\_\_\_

## ELECTIVE COURSES

### Other Suggested Electives:

CAS EC 513 Game Theory  
ENG MS 700 Advanced Special Topics  
GRS EC 716 Game Theory  
CAS CS 511 Object-Oriented Software  
Principles GSM OM 855 Project Management  
ENG SE 951 Independent Study  
ENG SE 954 MS Thesis  
ENG EC 601 Product Design in ECE  
CAS CS 542 Machine Learning  
ENG EC 504 Advanced Data Structures  
ENG EC 528 Cloud Computing

### Engineering Management Courses (no more than one permitted)

ENG ME 502 Invention: Technology Creation, Protection, &

### Commercialization

ENG ME 517 Product Development  
ENG ME 525 Technology Ventures  
ENG ME 550 Product Supply Chain Design  
ENG ME 583 Product Management  
ENG ME 584 Manufacturing Strategy  
ENG EK691 Lean and Agile New Product Development  
GSM OB 848 E1 The Leadership Challenge  
GSM SI 839 Design & Innovation Strategy  
GSM SI 852 Starting New Ventures  
GSM SI 871 Tech to Market  
GSM PL 870 Gov't, Society, & the New Entrepreneur  
ENG EK 731/GSM HM 801 Bench to Bedside

## Approved Practicum Courses:

1. SE 925 Graduate Project, OR
2. Two of the following, OR
  - ENG ME/MS 507 Process Modeling and Control
  - ENG ME/EC 514 Simulation
  - ENG SE/EC/ME 543 Sustainable Power Systems
  - ENG SE/EC/ME 544 Networking the Physical World
  - ENG ME 570 Robot Motion Planning
  - ENG SE/EC/ME 701 Optimal and Robust Control
  - ENG EC 702 Recursive Estimation and Optimal Filtering
  - ENG SE/ME 704 Adaptive Control
  - ENG SE/EC/ME 710 Dynamic Programming and Stochastic Control
  - ENG SE/ME 714 Advanced Stochastic Modeling and Simulation
  - ENG EC 715 Wireless Communications
  - ENG SE/EC/ME 724 Advanced Optimization Theory and Methods
  - ENG SE/EC/ME 725 Queuing Systems
  - ENG SE/EC/ME 732 Combinatorial Optimization and Graph Algorithms
  - ENG SE/EC/ME 733 Discrete Event and Hybrid Systems
  - ENG SE/ME/EC 734 Hybrid Systems
  - ENG SE/ME 740 Vision Robotics and Planning
  - ENG SE/EC 741 Randomized Network Algorithms
  - ENG EC 744 Mobile Networking and Computing
  - ENG SE/ME 755 Communication Networks Control
  - ENG SE/ME 762 Nonlinear Systems and Control
  - ENG SE/ME 765 Production System Design
  - ENG SE/ME 766 Advanced Scheduling Models and Methods
3. A Practicum Course from other College of Engineering departments:
  - ENG ME 526 – Simulation of Physical Processes
  - ENG ME 560 Precision Machine Design and Instrumentation
  - ENG EK691 Lean and Agile New Product Development
  - ENG BE 700 Advanced Topics in Biomedical Engineering
  - ENG EC 952 Directed Group Project