Course Handout

Instructor
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Office Hours: T/TH: 12:00 pm - 1:15 pm or by appt  

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Lecture
T/Th 10:30 a.m. - 11:45 a.m. in WANG 2579

Course website
https://mycourses.purdue.edu/

NOTE: All course materials and assignments/assessments/exams will be distributed collected via this website.

Course description
The goal for this course is to enable students to characterize, abstract, model, simulate, and analyze a system-of-systems (SoS). The course will cover a select few topics in detail, but also expose students to interesting areas of further study and highlight the importance of SoS in society. The course presents recent developments in frameworks for formulating system-of-systems problems, lexicon for their articulation, and analysis methodology for their study. Through team projects, students gain experience in formulating problems and demonstrate the application of tools and techniques. Applications for team projects will include transportation, space exploration, energy, defense, and infrastructure, though others are possible in consultation with instructor.

Course objectives
At the completion of this course, students will be able to:

- Recognize distinctive traits of a system-of-systems
- Understand the implications of these traits on modeling and operation
- Formulate system-of-systems design problems
- Develop/use appropriate modeling & analysis methods for these problems  
  (emphasis: network theory, complexity and agent-based modeling)
- Synthesize solution candidates for relevant decision criteria; explore validity
- Articulate problem formulation, analysis, and solution in written and verbal formats

Textbook
None required.


Grading

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<th>Component</th>
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<td>Team Project</td>
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<td>Homework Assignments</td>
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Project
Working in teams of 4-5 people, the team project allows students to demonstrate knowledge of key concepts through application, culminating in a final report in the form of draft peer reviewed journal article. Students will self-select into teams according to their interest in project topics provided by instructor (or self-generated, in consultation with instructor). Teams must successfully apply the 3-phase approach to SoS modeling presented in class. More details are given in the document ‘Project Guidelines’.

Homework Assignments
Four homework assignments will be given during the course of the semester and they comprise of 20% of the final grade.

Exam
The exam will be open book/notes, take-home style; thus, proctors for EPE students will not be required (unless otherwise specified). There is no Final Exam.

Readings
Many! (provided throughout the semester, through the Blackboard course web site.)
The assessments will be administered via the blackboard and will comprise of objective type questions. They will be based on the material covered in classes as well on the reading assignments.

Extra Credit
Extra credit will be given to the volunteers to be the Discussion Thread Leaders (discussion thread will be created by the instructor). The job of discussion thread leader is to participate in the discussion and summarize what was learned in that discussion thread in some encapsulated form (1 page or 5 slides). Each discussion thread allows 3-5 leaders.

Software
Students are expect to be capable (not expert) in MATLAB. Other software may be used that is a) appropriate to the modeling needs of their project, b) available to all Purdue students via ECN or ITAP, or is freeware. The following have been used in the past, others may be selected as needed by teams:

- Pajek (http://pajek.imfm.si/doku.php)
- UCINET (http://www.analytictech.com/ucinet/ucinet.htm)
- Microsoft Excel (with Crystal Ball Add-in)
- Netlogo (http://ccl.northwestern.edu/netlogo/)
- Vensim (http://www.vensim.com/software.html)

Academic Dishonesty
Purdue prohibits “dishonesty in connection with any University activity. Cheating, plagiarism, or knowingly furnishing false information to the University are examples of dishonesty.” [Part 5, Section III-B-2-a, University Regulations] Furthermore, the University Senate has stipulated that “the commitment of acts of cheating, lying, and deceit in any of their diverse forms (such as the use of substitutes for taking examinations, the use of illegal cribs, plagiarism, and copying during examinations) is dishonest and must not be tolerated. Moreover, knowingly to aid and abet, directly or indirectly, other parties in committing dishonest acts is in itself dishonest.” [University Senate Document 72-18, December 15, 1972]

Use of Copyrighted Material
Among the materials that may be protected by copyright law are the lectures, notes, and other material presented in class or as part of the course. Always assume the materials presented by an instructor are protected by copyright unless the instructor has stated otherwise. Students enrolled in, and authorized visitors to, Purdue University courses are permitted to take notes, which they may use for individual/group study or for other non-commercial purposes reasonably arising from enrollment in the course or the University generally.
Notes taken in class are, however, generally considered to be derivative works of the instructor’s presentations and materials, and they are thus subject to the instructor’s copyright in such presentations and materials. No individual is permitted to sell or otherwise barter notes, either to other students or to any
commercial concern, for a course without the express written permission of the course instructor. To obtain permission to sell or barter notes, the individual wishing to sell or barter the notes must be registered in the course or must be an approved visitor to the class. Course instructors may choose to grant or not grant such permission at their own discretion, and may require a review of the notes prior to their being sold or bartered. If they do grant such permission, they may revoke it at any time, if they so choose.

Grief Absence Policy for Students
Purdue University recognizes that a time of bereavement is very difficult for a student. The University therefore provides the following rights to students facing the loss of a family member through the Grief Absence Policy for Students (GAPS). GAPS Policy: Students will be excused for funeral leave and given the opportunity to earn equivalent credit and to demonstrate evidence of meeting the learning outcomes for misses assignments or assessments in the event of the death of a member of the student’s family.

Violent Behavior Policy
Purdue University is committed to providing a safe and secure campus environment for members of the university community. Purdue strives to create an educational environment for students and a work environment for employees that promote educational and career goals. Violent Behavior impedes such goals. Therefore, Violent Behavior is prohibited in or on any University Facility or while participating in any university activity.

Students with Disabilities
Purdue University is required to respond to the needs of the students with disabilities as outlined in both the Rehabilitation Act of 1973 and the Americans with Disabilities Act of 1990 through the provision of auxiliary aids and services that allow a student with a disability to fully access and participate in the programs, services, and activities at Purdue University.
If you have a disability that requires special academic accommodation, please make an appointment to speak with me within the first three (3) weeks of the semester in order to discuss any adjustments. It is important that we talk about this at the beginning of the semester. It is the student’s responsibility to notify the Disability Resource Center (http://www.purdue.edu/drc) of an impairment/condition that may require accommodations and/or classroom modifications.

Nondiscrimination
Purdue University is committed to maintaining a community which recognizes and values the inherent worth and dignity of every person; fosters tolerance, sensitivity, understanding, and mutual respect among its members; and encourages each individual to strive to reach his or her own potential. In pursuit of its goal of academic excellence, the University seeks to develop and nurture diversity. The University believes that diversity among its many members strengthens the institution, stimulates creativity, promotes the exchange of ideas, and enriches campus life.

Purdue University prohibits discrimination against any member of the University community on the basis of race, religion, color, sex, age, national origin or ancestry, genetic information, marital status, parental status, sexual orientation, gender identity and expression, disability, or status as a veteran. The University will conduct its programs, services and activities consistent with applicable federal, state and local laws, regulations and orders and in conformance with the procedures and limitations as set forth in Executive Memorandum No. D-1, which provides specific contractual rights and remedies. Any student who believes they have been discriminated against may visit www.purdue.edu/report-hate to submit a complaint to the Office of Institutional Equity. Information may be reported anonymously.

Emergencies
In the event of a major campus emergency, course requirements, deadlines and grading percentages are subject to changes that may be necessitated by a revised semester calendar or other circumstances beyond the instructor’s control. Relevant changes to this course will be posted onto the course website or can be obtained by contacting the instructors or TAs via email or phone. You are expected to read your @purdue.edu email on a frequent basis.

Emergency Preparedness
EMERGENCY NOTIFICATION PROCEDURES are based on a simple concept - if you hear a fire alarm inside, proceed outside. If you hear a siren outside, proceed inside.

* Indoor Fire Alarms mean to stop class or research and immediately evacuate the building.
* Proceed to your Emergency Assembly Area away from building doors. Remain outside until police, fire, or other emergency response personnel provide additional guidance or tell you it is safe to leave.

* All Hazards Outdoor Emergency Warning Sirens mean to immediately seek shelter (Shelter in Place) in a safe location within the closest building.

* "Shelter in place" means seeking immediate shelter inside a building or University residence. This course of action may need to be taken during a tornado, a civil disturbance including a shooting or release of hazardous materials in the outside air. Once safely inside, find out more details about the emergency*. Remain in place until police, fire, or other emergency response personnel provide additional guidance or tell you it is safe to leave.

In both cases, you should seek additional clarifying information by all means possible...Purdue Emergency Status page, text message, email alert, TV, radio, etc...review the Purdue Emergency Warning Notification System multi-communication layers at
http://www.purdue.edu/ehps/emergency_preparedness/warning-system.html

EMERGENCY RESPONSE PROCEDURES:

* Review the Emergency Procedures Guidelines
  https://www.purdue.edu/emergency_preparedness/flipchart/index.html

* Review the Building Emergency Plan (available on the Emergency Preparedness website or from the building deputy) for:
  * evacuation routes, exit points, and emergency assembly area;
  * when and how to evacuate the building;
  * shelter in place procedures and locations;
  * additional building specific procedures and requirements.

EMERGENCY PREPAREDNESS AWARENESS VIDEOS:

* "Shots Fired on Campus: When Lightning Strikes," is a 20-minute active shooter awareness video that illustrates what to look for and how to prepare and react to this type of incident. See:
  http://www.purdue.edu/securePurdue/news/2010/emergency-preparedness-shots-fired-on-campus-video.cfm (Link is also located on the EP website)

MORE INFORMATION Reference the Emergency Preparedness web site for additional information:
https://www.purdue.edu/ehps/emergency_preparedness/