

# SYLLABUS

## SYST 505 - Systems Engineering Principles

Fall 2015

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**Office Hours:** By appointment

**Course** This serves as a foundation for the other courses in the curriculum.

**Description:** During this course, the different components of the systems life cycle will be explored. Basic principles including requirements, design frameworks, functional systems, models, qualification strategy, maintenance and disposal will be covered. Lectures concerning these topics will be given by the instructor and will be supported by the listed texts. Students will be tested to ensure understanding of material contained within the lectures and the texts. Additionally, students will gain practical knowledge concerning this subject by modeling functional, state and object primitives. Credits: 3

**Course**

**Prerequisites:** None

**Text:** A Practical Guide to SysML, 3<sup>rd</sup> edition by Sanford Friedenthal, Alan Moore and Rick Steiner. MK OMG Press 2013. ISBN-10: 0128002026

**Grades:** 30% - homework

20% - midterm

20% - final

30% - group activities

Grades are assigned as follows: A= 92 – 100 B = 84 – 91.9 C= 76 – 83.9 D= 68 – 75.9 F= 0 – 67.9

## Course Expectations:

1. Proper preparation is expected every week. You are expected to log in to Blackboard each week and complete the assignments and activities on or before the due dates.
2. Students must check the class announcements in Blackboard on a daily basis for course announcements, which may include reminders, revisions, and updates.
3. It is expected that you will familiarize yourself with and adhere to the George Mason University Honor Code. Student members of the Mason community pledge not to cheat, plagiarize, steal, and/or lie in matters related to academic work. Students must adhere to the guidelines of the Honor Code [See <http://oai.gmu.edu/>].
4. It is essential to communicate any questions or problems to me promptly.

**Online Learning Community:** This online course is taught via Blackboard Courses (Log into <http://mymason.gmu.edu>, select the Courses Tab, and the course can be found in the Course List).

**Technology Requirements:** The technology requirements for this course are listed below:

**Hardware:** You will need access to a Windows or Macintosh computer with at least 2 GB of RAM and to a fast, reliable broadband Internet connection (e.g., cable, DSL). For optimum visibility of course material, the recommended computer monitor and laptop screen size is 13-inches or larger. You will need computer speakers or headphones to listen to recorded content if you are online student. A headset microphone is recommended for live audio sessions using course tools like Blackboard Collaborate. For the amount of computer hard disk space required if you are online, consider and allow for the space needed to: 1) install the required and recommended software and, 2) save your course assignments.

For hardware and software purchases, visit Patriot Computers.

**Software:** Web browser (See Blackboard Support for supported web browsers)

Blackboard Courses (Log into <http://mymason.gmu.edu>, select the Courses Tab)

Blackboard Collaborate (select from the course menu)

Adobe Acrobat Reader (free download)

Flash Player (free download)

Microsoft Office (purchase)

Note: If you are using an employer-provided computer or corporate office for class attendance, please verify with your systems administrators that you will be able to install the necessary applications and that system or corporate firewalls do not block access to any sites or media types.

**Learning Outcomes:** At the end of this course, students will be able to:

1. Understand the principles of systems engineering
2. Discuss differences between requirements-based and architectural-based design.
3. Create low-fidelity models using functional, state and object primitives.
4. Understand the rudiments of SysML and LML.

## **Exams**

**Closed book, closed notes, closed neighbor.** Online students must obtain a proctor for the exam. Proctoring materials may be found in Blackboard in “Proctoring Materials” to validate proctors and verify the taking of the exam.

In class students will take the test during the designated class period.

## **Student Expectations:**

### **Academic Integrity**

GMU is an Honor Code university; please see the University Catalog or <http://oai.gmu.edu/> for a full description of the code and the honor committee process. The principle of academic integrity is taken very seriously and violations are treated gravely. What does academic integrity mean in this course? Essentially this: when you are responsible for a task, you will perform that task. When you rely on someone else’s work in an aspect of the performance of that task, you will give full credit in the proper, accepted form. Another aspect of academic integrity is the free play of ideas. Vigorous discussion and debate are encouraged in this course, with the firm expectation that all aspects of the class will be conducted with civility and respect for differing ideas, perspectives, and traditions. When in doubt (of any kind) please ask for guidance and clarification.

Students must be responsible for their own work, and students and faculty must take on the responsibility of dealing explicitly with violations. The tenet must be a foundation of our university culture. [See <http://oai.gmu.edu/students-responding-to-alleged-violations/distance-learners/> ].

### **MasonLive/Email (GMU Email)**

Students are responsible for the content of university communications sent to their George Mason University email account and are required to activate their account and check it regularly. All communication from the university, college, school, and program will be sent to students solely through their Mason email account. [See <https://masonlivelogin.gmu.edu/login> ].

### **Patriot Pass**

Once you sign up for your Patriot Pass, your passwords will be synchronized, and you will use your Patriot Pass username and password to log in to the following systems: Blackboard, University Libraries, MasonLive, myMason, Patriot Web, Virtual Computing Lab, and WEMS. [See <https://password.gmu.edu/index.jsp> ].

## **University Policies**

Students must follow the university policies. [See <http://universitypolicy.gmu.edu> ].

Responsible Use of Computing Students must follow the university policy for Responsible Use of Computing. [See <http://universitypolicy.gmu.edu/policies/responsible-use-of-computing/> ].

University Calendar Students must follow the university policies. [See <http://registrar.gmu.edu/calendars/> ].

## **Students with Disabilities**

Students with disabilities who seek accommodations in a course must be registered with the George Mason University Office of Disability Services (ODS) and inform their instructor, in writing, at the beginning of the semester [See <http://ods.gmu.edu> ].

## **Student Services:**

### **University Libraries University**

The Mason library provides resources for both in class [See <http://library.gmu.edu/> ] and distance students. [See <http://library.gmu.edu/distance> ].

### **Writing Center**

The George Mason University Writing Center staff provides a variety of resources and services (e.g., tutoring, workshops, writing guides, handbooks) intended to support students as they work to construct and share knowledge through writing. [See <http://writingcenter.gmu.edu> ]. You can now sign up for an Online Writing Lab (OWL) session or for a face-to-face session in the Writing Center, which means you set the date and time of the appointment! Learn more about the Online Writing Lab (OWL) (found under Online Tutoring).

### **Counseling and Psychological Services**

The George Mason University Counseling and Psychological Services (CAPS) staff consists of professional counseling and clinical psychologists, social workers, and counselors who offer a wide range of services (e.g., individual and group counseling, workshops and outreach programs) to enhance students' personal experience and academic performance [See <http://caps.gmu.edu> ].

Family Educational Rights and Privacy Act (FERPA) The Family Educational Rights and Privacy Act of 1974 (FERPA), also known as the "Buckley Amendment," is a federal law that gives protection to student educational records and provides students with certain rights. [See <http://registrar.gmu.edu/privacy> ].

## CLASS SCHEDULE

Week 1>	31 August	<ul style="list-style-type: none"> <li>• Review Blackboard, Syllabus, Honor Code, Information Sheet</li> <li>• Introduction to Systems Engineering and MBSE</li> <li>• Introduction to Innoslate and LML/SysML</li> <li>• Introductions and Group formulation</li> <li>• <b>Group: Natural, Social, Engineered Systems</b></li> <li>• <b>Homework: Information sheet</b></li> <li>• <b>Homework: Honor Code</b></li> </ul>
Week 2>	7 September	<ul style="list-style-type: none"> <li>• Labor Day Holiday – No class</li> </ul>
Week 3>	14 September	<ul style="list-style-type: none"> <li>• Safety Critical Systems and the Economic Value of Systems Engineering</li> <li>• <b>Group: Piper Alpha Disaster</b></li> <li>• <b>Homework: Tragically Engineered System</b></li> </ul>
Week 4>	21 September	<ul style="list-style-type: none"> <li>• Systems Engineering: History</li> <li>• <b>Group: CA/T vs Pyramid of Giza Case Study</b></li> <li>• <b>Homework: Giza Pyramid</b></li> </ul>
Week 5>	28 September	<ul style="list-style-type: none"> <li>• Systems Fundamentals and Systems Thinking</li> <li>• <b>Group: Challenger Disaster and Systems Thinking</b></li> <li>• <b>Homework: System Thinking</b></li> </ul>
Week 6>	5 October	<ul style="list-style-type: none"> <li>• Representing Systems with Models – Functional and State Primitives</li> <li>• <b>Group: System Models – Functional and State</b></li> <li>• <b>Homework: System Models – Activity/Action Diagram</b></li> </ul>
Week 7>	13 October (Tuesday)	<ul style="list-style-type: none"> <li>• Representing Systems with Models – Object Primitives</li> <li>• <b>Homework: System Models – Use Cases</b></li> </ul>
Week 8>	19 October	<ul style="list-style-type: none"> <li>• Spring Break</li> </ul>
Week 9>	26 October	<ul style="list-style-type: none"> <li>• <b>Midterm</b></li> </ul>
Week 10>	2 November	<ul style="list-style-type: none"> <li>• SysML In-Depth</li> <li>• <b>Homework: SysML Assignment</b></li> </ul>
Week 11>	9 November	<ul style="list-style-type: none"> <li>• LML In-Depth</li> <li>• <b>Homework: LML Assignment</b></li> </ul>
Week 12>	16 November	<ul style="list-style-type: none"> <li>• System Life Cycles</li> <li>• <b>Homework: System Life Cycles</b></li> </ul>
Week 13>	23 November	<ul style="list-style-type: none"> <li>• Concept Definition</li> <li>• <b>Group: Concept and System Definition</b></li> </ul>
Week 14>	30 November	<ul style="list-style-type: none"> <li>• System Realization and Deployment</li> <li>• <b>Group: System Realization and Deployment; System Standards</b></li> </ul>
Week 15>	7 December	<ul style="list-style-type: none"> <li>• Product Systems Engineering</li> <li>• System of Systems</li> <li>• <b>Group: Product Systems Engineering; System of Systems</b></li> </ul>
Week 16>	14 December	<ul style="list-style-type: none"> <li>• Final</li> </ul>