



## Course Syllabus — **ENPM808K**

# Advanced Topics in Engineering; Advanced Systems Architecting

**ENPM808K**  
Summer 2020

### Course Overview

This course extends and further ties together the MSSE systems engineering course progression with a comprehensive focus on system architecture that drives systems and enterprise engineering decision making at many levels. The course continues the INCOSE/OMG-influenced model-based approach developed throughout the ENSE 621-623 progression by introducing students to models for enterprise, business, systems-level, service/component level, discipline-specific architectures. Topics include: architecture as a concept and practice; standards and terms for architectural description; architectural frameworks, languages, and patterns; agility; architectural tool use and challenges; and a detailed exploration of the current systems architectural methodologies supporting the federal, defense, business/mission, and software communities. The course includes a progression of small class projects in which students will use integrated architecting tools to solve problems of interest to them and that stress the capture, analysis, reconciliation, leverage, and execution of architecture at many levels and the exercise of ANSI/ISO/IEC/IEEE standards for architectural description.

### Learning Outcomes

After successfully completing this course you will be able to:

- Define Architecture and Architecting, and define the roles of Systems Architecture, Reference Architecture, Business Architecture, and Enterprise Architecture.
- Differentiate and contrast the complementary roles and processes of engineering and architecting.
- Describe agile practices that make architecting more responsive and efficient.
- Develop an ISO/IEC/IEEE 42010-compliant architecture description of a system of interest.
- Model stakeholder-driven viewpoints and views of enterprise systems of interest and system contexts.
- Interpret applications of the Federal Enterprise Architecture reference model set for a system of interest.
- Generate business process models and notations for simple business processes.
- Generate a simple ArchiMate model of an enterprise system context.
- Define and apply the Considerations, Standards, Visions, Landscapes, Outlines and Designs (CSVLOD) model for systems / business alignment to a system of interest.
- Develop basic “as-a-service” cloud computing architecture models.
- Model system architectural elements and behaviors in SysML for

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#### Class Meets

Monday  
17:30-20:45  
Online

#### Office Hours

Thursday  
19:00-21:00  
and by appointment

#### Teaching Assistants

N/A

#### Prerequisites

N/A

#### Course Communication

Most comms are through the Canvas page but feel free to contact me via email.

## Required Resources

Course website: <https://umd.instructure.com/courses/1283642>

### Readings:

- INCOSE Systems Engineering Handbook, 4th Ed., Shortell ed., (2015)
- MagicGrid Book of Knowledge, Aleksandraviciene and Morkevicius (2018) – provided as pdf.
- Various, assigned each week.

### Hardware/Software:

- Cameo Systems Modeler (license to be provided)
- Archimate or equivalent (open source)

## Supplemental Resources

### Readings:

- The Practice of Enterprise Architecture: A Modern Approach to Business and IT Alignment, Kotusev (2018)
- The Art of Systems Architecting, 3rd Ed., Maier (2009)
- Collaborative Enterprise Architecture, Langade and Bente, (2012)

### Hardware/Software:

None.

## Campus Policies

It is our shared responsibility to know and abide by the University of Maryland's policies that relate to all courses. Please visit <https://academiccatalog.umd.edu/graduate/policies/academic-record/> for the Office of Graduate Studies' list of campus-wide policies.

## Activities, Learning Assessments, and Expectations

The homework in this course is designed to supplement the lectures with practical exposure to architectural methods and tools. The tests are designed to gauge and support learning of the course material and an opportunity will be offered to rebut and defend answers provided during post test reviews. The following assignments are described in more detail on the course's Canvas page:

- HW1: The DIYAF - Your Own Architecture Description Framework (8.33%)  
This project will have you design your own architectural framework using ISO/IEC/IEEE 42020:2010 viewpoints and views for a system / problem of your choosing. In doing so, you will experience the identification of stakeholders and their concerns, the challenge of constructing suitable viewpoints, and generation of their resulting views.
- HW2: Exploring SysML and Cameo Systems Modeler (8.33%)

Homework 2 is designed to give you some exposure to model-based systems engineering (MBSE) which uses a series of SysML diagrams to capture, organize, and use much of the information that the systems engineering processes generate - to include elements of a system architecture.

- HW3: Using Archimate (8.33%)

This assignment will give you the chance to explore using a lightweight architecting language called ArchiMate developed by the Open Group. With ArchiMate, you will be able to form simple models of enterprise IT enablement.

- HW4: Reporting on a Reference Architecture (8.33%)

This homework concerns discovering reference architectures and architectural patterns that are relevant to your engineering focus or interest in the implementation domain (e.g., big data analytics, cloud security, automotive, mobile computing).

- Midterm Exam (33%)

This online exam covers roughly the first half of the course and is a mixture of short answer, multiple choice, and matching questions.

- Final Exam (33%)

This online exam covers second half of the course and is a mixture of short answer, multiple choice, and matching questions.

## Course Specific Policies

- I will accept late work will but will grade it against a gradient roughly equivalent to a 10% penalty for each day that an assignment is considered late. If you anticipate that a homework will be turned in late, please communicate with me in advance and we can likely work out an extension.
- While absences will not affect your grade, I highly encourage synchronous attendance of the classes and your notifying me that you will miss a class. Missed classes can be made up from class recordings.
- I will announce test date / time windows in advance; you shall make all efforts to access and take the online tests during these windows.
- Preferred communication with me outside of class time is via my UMD email: [eveleigh@umd.edu](mailto:eveleigh@umd.edu). I will try to respond to all inquiries within 12 hours of receipt.
- Use of voice and chat during the classes is encouraged.
- I will use the Turnitin capability for plagiarism detection on class homework. I have chosen this tool because it can help you improve your scholarly writing and help me verify the integrity of student work. For information about Turnitin, how it works, and the feedback reports that it issues, visit this [site](#).

## Accessibility and Reasonable Accommodations

The University of Maryland is committed to creating and maintaining a welcoming and inclusive educational, working, and living environment for people of all abilities. The University of Maryland is also committed to the principle that no qualified individual with a disability shall, on the basis of disability, be excluded from participation in or be denied the benefits of the services, programs, or activities of the University, or be subjected to discrimination. The University of Maryland provides reasonable accommodations to qualified individuals. Reasonable accommodations shall be made in a timely manner and on an individualized and flexible basis.

Discrimination against individuals on the grounds of disability is prohibited. The University also strictly prohibits retaliation against persons arising in connection with the assertion of rights under this Policy.

Accessibility & Disability Service (ADS) facilitates reasonable accommodations to qualified individuals. For assistance in obtaining an accommodation, contact Accessibility and Disability Service at [301.314.7682](tel:301.314.7682), or [adsfrontdesk@umd.edu](mailto:adsfrontdesk@umd.edu). More information is available from the [Counseling Center](#).

## Get Some Help!

You are expected to take personal responsibility for your own learning. This includes acknowledging when your performance does not match your goals and doing something about it. Everyone can benefit from some expert guidance on time management, note taking, and exam preparation, so I encourage you to consider visiting <http://ter.ps/learn> and schedule an appointment with an academic coach. Sharpen your communication skills (and improve your grade) by visiting <http://ter.ps/writing> and schedule an appointment with the campus Writing Center. Finally, if you just need someone to talk to, visit <http://www.counseling.umd.edu>.



Everything is free because you have already paid for it, and **everyone needs help**... all you have to do is ask for it.

## Names/Pronouns and Self Identifications

The University of Maryland recognizes the importance of a diverse student body, and we are committed to fostering equitable classroom environments. I invite you, if you wish, to tell us how you want to be referred to both in terms of your name and your pronouns (he/him, she/her, they/them, etc.). The pronouns someone indicates are not necessarily indicative of their gender identity. Visit [trans.umd.edu](https://trans.umd.edu) to learn more.

Additionally, how you identify in terms of your gender, race, class, sexuality, religion, and dis/ability, among all aspects of your identity, is your choice whether to disclose (e.g., should it come up in classroom conversation about our experiences and perspectives) and should be self-identified, not presumed or imposed. I will do my best to address and refer to all students accordingly, and I ask you to do the same for all of your fellow Terps.

## Grades

It is expected that you will devote about 6-8 hours to this course each week. Every effort has been made to evenly distribute the course requirements, and to support your understanding of the course material. However, it is likely that some weeks will require more effort on your part, and some material will require additional help beyond what is immediately available. Please reach out to me for these course-related questions, and please be prepared to put in the additional effort.

For this course, some of your assignments will be collected via Turnitin on our course ELMS page. I have chosen to use this tool because it can help you improve your scholarly writing and help me verify the integrity of student work. For information about Turnitin, how it works, and the feedback reports you may have access to, visit [Turnitin Originality Checker for Students](#).

Grades are not given, but earned. Your grade is determined by your performance on the learning assessments in the course and is assigned individually (not curved). If earning a particular grade is important to you, please speak with me at the beginning of the semester so that I can offer some helpful suggestions for achieving your goal.

All assessment scores will be posted on the course ELMS page. If you would like to review any of your grades (including the exams), or have questions about how something was scored, please email me to schedule a time for us to meet in my office.

Late work will not be accepted for course credit so please plan to have it submitted well before the scheduled deadline. I am happy to discuss any of your grades with you, and if I have made a mistake I will immediately correct it. Any formal grade disputes must be submitted in writing and within one week of receiving the grade.

The course grade will be computed from these weights:

Learning Assessments	#	Points Each	Category Total	Category Weight
<b>Homeworks:</b> To be submitted via ELMS	4	10	40	33.3%
<b>Exams (EX)</b>	2	100	200	66.6%
<b>Total Points:</b>			<b>700</b>	

Final letter grades are assigned based on the percentage of total assessment points earned. To be fair to everyone I have to establish clear standards and apply them consistently, so please understand that being close to a cutoff is not the same as making the cut (89.99  $\neq$  90.00). It would be unethical to make exceptions for some and not others.

Final Grade Cutoffs				
+	97.00%	+	87.00%	+ 77.00% + 67.00%
A	94.00%	B	84.00%	C 74.00% D 64.00% F <60.0%
-	90.00%	-	80.00%	- 70.00% - 60.00%

## Course Schedule

Date	Topic / Item
Mon Jun 1	<a href="#">S1: Architecture and Architecting</a>
Mon Jun 8	<a href="#">S1: Architecture &amp; Architecting (2); S2: The Architectural Continuum</a>
Mon Jun 1	<a href="#">S3: Solutions &amp; Systems Architecture</a>
Mon Jun 22	<a href="#">S3: Systems (2);S4: Enterprise Architecture</a>
	Due: <a href="#">HW1: The DIYAF - Your Own Architecture Description Framework</a>
Mon Jun 29	<a href="#">S5: General &amp; Defense Architecture</a>
Mon Jul 6	<a href="#">S6: Federal Architecture</a>
Mon Jul 13	<a href="#">S7: Improved EA Artifacts</a>
	Due: online <a href="#">Midterm</a> (window 17:30 Jul 10 to 17:30 Jul 13)
	Due: <a href="#">HW2: Exploring SysML and Cameo Systems Modeler</a>
Mon Jul 20	<a href="#">S8: On Business and IT Architecture</a>
Mon Jul 27	<a href="#">S8: Business &amp; IT (2); S9: EA Processes</a>
	Due: <a href="#">HW3: Using Archimate</a>
Mon Aug 3	<a href="#">S9: EA Processes (2); S10:Discipline Specific Architecture</a>
Mon Aug 10	<a href="#">S10: Discipline Specific (2); S11:Closing the Second Chasm</a>
Mon Aug 17	<a href="#">S11: Second Chasm (2); S12: Wrap Up</a>

	Due: Online <a href="#">Final</a> (window 17:30 Aug 14 to 17:30 Aug 17)
	Due: <a href="#">HW4: Reporting on a Reference Architecture</a>

**Note:** This is a tentative schedule, and subject to change as necessary – monitor the course ELMS page for current deadlines. In the unlikely event of a prolonged university closing, or an extended absence from the university, adjustments to the course schedule, deadlines, and assignments will be made based on the duration of the closing and the specific dates missed.