

Standard Syllabus format for **Courses** that support the M&S project:

- 1) Course name: M&S Requirements and Evaluating M&S Proposals
- 2) Course coordinator: Eric W. Weisel, Ph.D.
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- 3) Course description: The student will learn to compare M&S proposals, relative to measurable program contributions. The student will learn the decision making process on the appropriate program office level of expenditure on M&S tools throughout the program life cycle. The student will learn how to make decisions as to whether custom or off-the-shelf products will be best suited for the program's purpose. The student will establish and write valid modeling and simulation requirements using a process that includes modeling and simulation needs analysis, generation of valid modeling and simulation requirements, functional decomposition and conceptual model development, and issuance of "built to" or "buy to" performance specifications. The student will understand how models and simulations evolve in fidelity, resolution, and scope as the program life cycle progresses
- 4) Modules incorporated into the Course: A3, P5
- 5) **ESRs that the course supports and corresponding level of mastery.**
 - a) The role of M&S throughout the acquisition cycle
Competency Level: General Awareness
 - b) M&S Support Plan.
Competency Level: General Awareness
 - c) Legacy, developmental, GOTS and COTS M&S.
Competency Level: General Awareness
 - d) The V&V process.
Competency Level: Understanding
 - e) M&S reuse.
Competency Level: Understanding
 - f) Application of a sample M&S Support Plan
Competency Level: Application
 - g) Development of an M&S budget.

Competency Level: Mastery

- h) Analysis and selection from available M&S options.
Competency Level: Mastery
 - i) M&S development and VV&A lifecycle
Competency Level: Understanding
 - j) Domains of M&S requirements
Competency Level: Understanding
 - k) Representational requirements in M&S
Competency Level: Understanding
 - l) Conceptual model development and validation
Competency Level: General Awareness
 - m) Process differences between legacy and new development models
Competency Level: Understanding
 - n) Work products available in M&S development
Competency Level: Understanding
 - o) Changes in M&S fidelity, resolution, and scope across the acquisition lifecycle
Competency Level: Understanding
 - p) Acceptability criteria
Competency Level: Understanding
 - q) Selecting M&S
Competency Level: Mastery
 - r) Developing and Evaluating M&S Requirements
Competency Level: Mastery
- 6) Prerequisites assumed, and corresponding level of mastery. General awareness of the government acquisition process.
- 7) Course maturity: none
- 8) Number of contact hours and pace contemplated: 3 hours lecture/week for 16 weeks
- 9) Proposed Delivery modality; face-to-face and/or on-line.
- 10) Module learning objectives:

- A3.1 Define the role of M&S throughout the acquisition cycle (e.g., Concept Development, DT&E, OT&E, LFT&E, and operations and sustainment)
- A3.2 Understand the development of M&S requirements.
- A3.3 Describe the use of an M&S Support Plan throughout the acquisition cycle.
- A3.4 Define and distinguish between legacy, developmental, GOTS and COTS M&S.
- A3.5 Understand the V&V process and its impact on M&S usage, acceptability, and cost.
- A3.6 Understand the benefit and application of M&S reuse across programs and across a single program's lifecycle.
- A3.7 Apply a sample M&S Support Plan to provide best use of M&S across all stages of the acquisition life-cycle.
- A3.8 Given a case study and sample M&S Support Plan, develop an M&S budget.
- A3.9 Given a case study and sample M&S Support Plan, select between available legacy, developmental, GOTS and COTS M&S options.
- P5.1 Describe the M&S development and VV&A lifecycle (for COTS, GOTS and new development M&S)
- P5.2 Identify the three domains of M&S requirements (user domain, problem domain, and simulation domain)
- P5.3 Describe the types of representational requirements (e.g., entities, actions, tasks, interactions, behaviors) in M&S and standard methods for capturing them (e.g. UML, conceptual model descriptions)
- P5.4 Describe how M&S requirements, representational requirements, acceptability criteria, and intended use support conceptual model development and validation
- P5.5 Describe the M&S process differences between legacy (no, minor & major modifications) and new development models
- P5.6 Describe the work products available in M&S development and their role in VV&A
- P5.7 Describe how M&S fidelity, resolution, and scope changes across the acquisition lifecycle (e.g., concept refinement to DT to OTA to OT to training)
- P5.8 Describe the role of acceptability criteria in the VV&A process and its relationship to M&S requirements
- P5.9 Given a case study, select those requirements which are appropriate for M&S
- P5.10 Given a case study and sample acquisition documents (TEMP, CDD, ICD, PSPEC), develop or evaluate requirements for M&S

11) Course learning objectives: Mastery of M&S management in the acquisition lifecycle including development and use of an MSSP and evaluation and selection of appropriate and cost effective M&S products. Mastery to be demonstrated by a grade of not less than B+ on final projects and exams. Mastery of valid M&S requirements

for performance specifications in fidelity, resolution, and scope as program life cycles progress. Mastery demonstrated by a grade of 90% correct on a final course exam.

12) Course assessment plan: projects and exams.

13) Testing Strategies: Multiple Choice, True/False, Short Answer, Essay Questions, and Evaluation of a Case Study

14) Topic list by hour of instruction and reference:

Competency Level: General Awareness

i) Hour 1: (Sub ESR A3.1). Introduction and Overview (course notes and syllabus). [1]

Competency Level: General Awareness

ii) Hour 2: (Sub ESR A3.1). The Role of M&S in Concept Development and DT&E. [1]

Competency Level: General Awareness

iii) Hour 3: (Sub ESR A3.1). The Role of M&S in OT&E, LFT&E, and Operations and Sustainment. [1]

Competency Level: General Awareness

iv) Hour 4: (Sub ESR A3.2). Development of M&S Requirements

Competency Level: General Awareness

v) Hour 5: (Sub ESR A3.2). Development of M&S Requirements

Competency Level: General Awareness

vi) Hour 6: (Sub ESR A3.2). Development of M&S Requirements

Competency Level: General Awareness

vii) Hour 7: (Sub ESR A3.3). The MSSP; Requirements Across the Services and Best Practices. [2]

Competency Level: Understanding

viii) Hour 8 (Sub ESR A3.3). The MSSP; Requirements Across the Services and Best Practices. [2]

Competency Level: General Awareness

ix) Hour 9: (Sub ESR A3.4). M&S Types and Sources. [3]

Competency Level: Understanding

x) Hour 10: (Sub ESR A3.4). M&S Types and Sources. [3]

Competency Level: Understanding

xi) Hour 11: (Sub ESR A3.4). M&S Types and Sources. [3]

Competency Level: General Awareness

xii) Hour 12: (Sub ESR A3.5). V&V and M&S application, acceptability and cost. [4]

Competency Level: Understanding

xiii) Hour 13: (Sub ESR A3.5). V&V and M&S application, acceptability and cost. [4]

Competency Level: Understanding

xiv) Hour 14: (Sub ESR A3.5). V&V and M&S application, acceptability and cost. [4]

Competency Level: General Awareness

xv) Hour 15: (Sub ESR A3.6) M&S Use and Re-use Across Multiple Programs. [1] [3]

Competency Level: Understanding

xvi) Hour 16: (Sub ESR A3.6). M&S Use and Re-use Across Multiple Programs. [1] [5]

Competency Level: Application

xvii) Hour 17: (Sub ESR A3.6). M&S Use and Re-use Across Multiple Programs [1] [5]

Competency Level: Mastery

xviii) Hour 18: (Sub ESR A3.7). MSSP Application Project. [1] [5]

Competency Level: Mastery

xix) Hour 19: (Sub ESR A3.7). MSSP Application Project. [1] [5]

Competency Level: Mastery

xx) Hour 20: (Sub ESR A3.7). MSSP Application Project. [1] [5]

Competency Level: Mastery

xxi) Hour 21: (Sub ESR A3.8). MSSP and M&S Budget Project. [1] [5]

Competency Level: Mastery

xxii) Hour 22: (Sub ESR A3.8). MSSP and M&S Budget Project. [1] [5]

Competency Level: Mastery

xvii) Hour 23: (Sub ESR A3.8). MSSP and M&S Budget Project. [1] [5]

Competency Level: Mastery

xxiii) Hour 24: (Sub ESR A3.9). MSSP and M&S Selection Project. [1] [5]

Competency Level: Mastery

xxiv) Hour 25: (Sub ESR A3.9). MSSP and M&S Selection Project. [1] [5]

Competency Level: Mastery

xxv) Hour 26: (Sub ESR A3.9). MSSP and M&S Selection Project. [1] [5]

Competency Level: Understanding

xxvi) Hour 27: (Sub ESR P5.1). Introduction and Overview (course notes and syllabus) [6] [1] [4]

Competency Level: Understanding

xxvii) Hour 28: (Sub ESR P5.1). M&S development and VV&A lifecycle for COTS and GOTS. [6] [1] [4]

Competency Level: Understanding

xxviii) Hour 29: (Sub ESR P5.1). M&S development and VV&A lifecycle for new development M&S. [6] [4]

Competency Level: General Awareness

xxix) Hour 30: (Sub ESR P5.2). The three domains of M&S requirements. [6]

Competency Level: General Awareness

xxix) Hour 31: (Sub ESR P5.2). The three domains of M&S requirements. [6]

Competency Level: Understanding

xxx) Hour 32: (Sub ESR P5.3). Representational requirements in M&S and standard methods for capturing them. [6]

Competency Level: Understanding

xxxi) Hour 33: (Sub ESR P5.3). Representational requirements in M&S and standard methods for capturing them. [6] [4]

Competency Level: Understanding

xxxii) Hour 34: (Sub ESR P5.4). Conceptual model development and validation. [6] [4]

Competency Level: Understanding

xxxiii) Hour 35: (Sub ESR P5.4). Conceptual model development and validation. [6] [4]

Competency Level: Understanding

xxxiv) Hour 36: (Sub ESR P5.4). Conceptual model development and validation. [6] [4]

Competency Level: General Awareness

xxxv) Hour 37: (Sub ESR P5.5). M&S process differences between legacy (no, minor & major modifications) and new development models. [6]

Competency Level: General Awareness

xxxvi) Hour 38: (Sub ESR P5.6). Work products available in M&S development and their role in VV&A. [6] [4] [3]

Competency Level: General Awareness

xxxvii) Hour 39: (Sub ESR P5.6). Work products available in M&S development and their role in VV&A. [6] [4] [3]

Competency Level: Understanding

xxxviii) Hour 40: (Sub ESR P5.6). Work products available in M&S development and their role in VV&A. [6] [4] [3]

Competency Level: Understanding

xxxix) Hour 41: (Sub ESR P5.7). Changes in M&S fidelity, resolution, and scope across the acquisition lifecycle. [6] [1] [4]

Competency Level: Understanding

xl) Hour 42: (Sub ESR P5.7). Changes M&S fidelity, resolution, and scope across the acquisition lifecycle. [6] [1] [4]

Competency Level: Understanding

xli) Hour 43: (Sub ESR P5.7). Changes M&S fidelity, resolution, and scope across the acquisition lifecycle. [6] [1] [4]

Competency Level: Understanding

xlii) Hour 44: (Sub ESR P5.8). Acceptability criteria in the VV&A process. [6] [4]

Competency Level: Application

xliii) Hour 45: (Sub ESR P5.8). Acceptability criteria in the VV&A process and its relationship to M&S requirements. [6] [4]

Competency Level: Application

xliiii) Hour 46: (Sub ESR P5.8). Acceptability criteria in the VV&A process and its relationship to M&S requirements. [6] [4]

Competency Level: Application

xliv) Hour 47: (Sub ESR P5.9). M&S Selection Project. [6] [4]

Competency Level: Application

xlv) Hour 48: (Sub ESR P5.9). M&S Selection Project. [6] [4]

Competency Level: Mastery

- 1) Hour 49: (Sub ESR P5.9). M&S Selection Project. [6] [4]

Competency Level: Application

- li) Hour 50: (Sub ESR P5.10). M&S Requirements Development and Evaluation Project [6] [4]

Competency Level: Application

- lii) Hour 51: (Sub ESR P5.10). M&S Requirements Development and Evaluation Project. [6] [4]

Competency Level: Mastery

- liii) Hour 52: (Sub ESR P5.10). M&S Requirements Development and Evaluation Project. [6] [4]

15) Proposed references and texts:

- [1] DoD. 2004. *Defense Acquisition Guidebook*. <https://akss.dau.mil/dag/>
- [2] Department of the Army. 2005. *Simulation Support Planning and Plans*. (DA PAM 5-12) http://www.army.mil/usapa/epubs/pdf/p5_12.pdf
- [3] Rubenstein, R. Y., B. Melamel. 1998. *Modern Simulation and Modeling*. John Wiley and Sons, Inc., New York, NY.
- [4] DoD. 2006. *VV&A Recommended Practices Guide*. <http://vva.dmsomil/>
- [5] DoD. 1994. DoD *Directive 5000.59 Modeling and Simulation Management*. <https://www.dmsomil/public/library/policy/policy/d500059p.pdf>
- [6] Law, A.M., and W.D. Kelton, *Simulation Modeling and Analysis*, Seventh Edition, McGraw-Hill, Boston, 1991