Modeling and Simulation Syllabus

1) Course name: M&S in the Acquisition Process, Part 2

2) Course coordinator / point of contact and contact information
   Jim Campbell, GMU, jcampbell@alionscience.com, 703-933-3356

3) Course description: At the completion of this course, students will be able to describe the M&S used in the final phases of the Acquisition Life Cycle, using the progression of different modeling and simulation applications in use in each phase as a benchmark. They will be able to identify a particular tool and apply it appropriately to the correct point in the lifecycle and relate specific tools to the decision points that separate the acquisition phases. They will be able to identify sustainment and training support M&S for a representative system.

4) Educational Skill Requirements (ESR) that the course supports. This course incorporates a number of ESR that will make students more proficient in the performances of their acquisition related duties and responsibilities. Students will be able to:
   a) Describe the types, role and value of formal Modeling and Simulations, and their various characterizations for application to systems management, particularly with regard to design, testing, training, production, cost estimation, manning, and logistical simulations.
   b) Understand the critical decisions in the acquisition lifecycle and how/what M&S is used to inform those decisions in order to reduce the time resources and risk associated with the acquisition process
   c) Describe the role of modeling and simulation prior to the concept decision to identify and quantify capability gaps and to estimate how well new program concepts might address those gaps.
   d) Know models and simulations used in a given phase of the acquisition process, their inputs and outputs, and their capabilities and limitations.

5) Prerequisites: Students must have completed M&S in the Acquisition Process, Part 1 prior to attending this course and should have completed ACQ 101, ACQ 201, and Essentials of Modeling and Simulation prior to that.

6) Course maturity: Development complete.

7) Number of contact hours and pace contemplated 42 contact hours, in 14 three-hour sessions

8) Delivery format is for classroom, face-to-face or VTC, presentation of course material.

9) References and texts:
a) Acquisition M&S Course Bibliography:


vi) Department of Defense, Deputy Secretary of Defense, Defense Acquisition Performance Assessment, Washington, DC, January 2006


xiii) NASA, Mars Climate Orbiter Mishap Investigation Board, Phase I Report, November 10, 1999


**b) Publications and Regulations**

i) DoD Directive 5000.01, Defense Acquisition System, 12 May 2003


v) DoD Instruction 5000.61, DoD Modeling and Simulation (M&S) Verification, Validation, and Accreditation (VV&A), 13 May 2003

vi) Defense Acquisition Guidebook, Version 1.0, 17 October 2004

vii) DoD Acquisition Modeling and Simulation Master Plan (AMSMP), 17 April, 2006


x) Strategic Plan for Transforming DoD Training, Office of the Under Secretary of Defense for Personnel and Readiness Director, Readiness and Training Policy and Programs, 8 May 2006


c) Joint Chiefs


ii) CJCSI 3170.01G, Joint Capabilities Integration and Development System, 1 Mar 2009

d) Services

i) AR 70-1, Army Acquisition Policy, 31 December 2003

ii) AR 5-11, Management of Army Models & Simulations, 1 February 2005

iii) DA PAM 5-11, Verification, Validation and Accreditation of Army Models and Simulations, 30 September 1999

iv) DA PAM 5-12, Simulation Support Planning and Plans, 2 March 2005

v) DA Pam 70-3, Army Acquisition Procedures, 28 January 2008

vi) SECNAVINST 5000.2C, [Operation of the Defense Acquisition System], 19 November 2004

vii) SECNAVINST 5200.38A, Department Of The Navy Modeling And Simulation Program, 28 February 2002

viii) SECNAVINST 5200.40 VV&A, 19 April 1999
10) Course learning objectives:

a) Describe primary and secondary types of M&S functions that support the Design Review Assessments (P/CDR-A).
b) Identify the intended use of each type of M&S supporting the P/CDR-A.
c) Identify representative examples of each type of M&S supporting the P/CDR-A.
d) Identify the principal M&S applications used during System Capability and Manufacturing Process Demonstration.
e) Describe representative examples of M&S used for each type of application.
f) List the inputs, outputs, capabilities and limitations of each example M&S.
g) Describe primary and secondary types of M&S functions that support MS C.
h) Identify the intended use of each type of M&S supporting MS C.
i) Identify representative examples of each type of M&S supporting MS C.
j) Describe the cost/benefits of physical testing vis-a-vis modeling and simulation.
k) Describe the risks of physical testing vis-a-vis modeling and simulation.
l) Describe how physical test, M&S and historical data can be combined to provide effective decision support.
m) Describe primary and secondary types of M&S functions that support the Full Rate Production Decision (FRPD).
n) Identify the intended use of each type of M&S supporting the FRPD.
o) Identify representative examples of each type of M&S supporting the FRPD.
p) Identify the principal M&S applications used in support of equipment fielding.
q) Describe representative examples of M&S used for each type of application.
r) List the inputs, outputs, capabilities and limitations of each example M&S.
s) Identify the principal M&S applications used for training during operations and sustainment.
t) Describe representative examples of M&S used for each type of application.
u) List the inputs, outputs, capabilities and limitations of each example M&S.
v) Identify the principal M&S applications used for life cycle sustainment.
w) Describe representative examples of M&S used for each type of application.
List the inputs, outputs, capabilities and limitations of each example M&S.

11) Course assessment plan: Examination, quiz, and research paper and presentation.

12) Topic list by hour of instruction and reference.
  i) Lesson one: Introduction and Review
     (1) Hour one: Introduction and overview (course notes and syllabus)
     (2) Hour two: Review of M&S in Acq Part 1 (course notes, materials provided in the previous course)
     (3) Hour three: Mini case/case review (course notes and syllabus, DoDD 5000.59, AMSMP)
  ii) Lesson two: M&S Completing EMD
     (1) Hour one: M&S in EMD: Computer Aided Design (CAD Report Article, CADD Primer, DoDI 5000.2, Defense Acquisition Guidebook, course notes)
     (2) Hour two: M&S in EMD: System Capability and Manufacturing Process Demonstration (CADD Primer, DoDI 5000.2, Defense Acquisition Guidebook, course notes)
     (3) Hour three: M&S in support of the Milestone C Decision (DoDI 5000.2, Defense Acquisition Guidebook, course notes)
  iii) Lesson three: Practical Application
     (1) Hour one: Practical Exercise (Defense Acquisition Performance Assessment Summary, 21st Century Jet, Ford Article, Defense Acquisition Reform Article, course notes)
     (2) Hour two: Practical Exercise (Defense Acquisition Performance Assessment Summary, 21st Century Jet, Ford Article, Defense Acquisition Reform Article, course notes)
     (3) Hour three: Quiz (course notes and syllabus)
  iv) Lesson four: M&S in Test and Evaluation
     (1) Hour one: T&E Overview (DoDI 5000.02, Defense Acquisition Guidebook, course notes)
     (2) Hour two: M&S in Test and Evaluation (DoDI 5000.2, Defense Acquisition Guidebook, course notes)
     (3) Hour three: Mini Case NPS Ship Shock Case
  v) Lesson five: M&S in Production and Deployment
     (1) Hour one: M&S in Support of the Full-Rate Production Decision (DoDI 5000.2, Defense Acquisition Guidebook, course notes)
(2) Hour two: M&S in Support of Equipment Fielding (DoDI 5000.2, Defense Acquisition Guidebook, course notes)
(3) Hour three: The Simulation Support Plan (DA Pam 5-12, MSSP Template (in class handout), Defense Acquisition Guidebook, course notes)
vi) Lesson six: Practical application (DoDI 5000.02, Defense Acquisition Guidebook, course notes)
   (1) Hour one: Practical Exercise overview (Student handouts, course notes and syllabus)
   (2) Hour two: Student Activity (course notes and syllabus)
   (3) Hour three: Student Presentations (course notes, DoD 5000.59M, DoDI 5000.61)
vii) Lesson seven: M&S for Training
   (1) Hour one: M&S for Training (DoDI 5000.02, Defense Acquisition Guidebook, Strategic Plan for Transforming DoD Training, course notes)
   (2) Hour two: M&S for Training (DoDI 5000.02, Defense Acquisition Guidebook, Strategic Plan for Transforming DoD Training, course notes)
   (3) Hour three: M&S for Training (DoDI 5000.02, Defense Acquisition Guidebook, Strategic Plan for Transforming DoD Training, course notes)
viii) Lesson eight: Individual Topic Review and Independent Research
   (1) Hour one: Office hours and library research
   (2) Hour two: Office hours and library research
   (3) Hour three: Office hours and library research
ix) Lesson nine: M&S for Sustainment
   (1) Hour one: M&S for Sustainment (The Hybrid Supply Chain Model Article, Strategic Mobility Models Paper, DoDI 5000.02, Defense Acquisition Guidebook, course notes)
   (2) Hour two: Practical Exercise: M&S for Sustainment (Student Handouts, The Hybrid Supply Chain Model Article, Strategic Mobility Models Paper, DoDI 5000.02, Defense Acquisition Guidebook, course notes)
   (3) Hour three: Practical Exercise/Student Presentations
x) Lesson ten: Individual Student Papers
   (1) Hour one: Student Paper Presentations
   (2) Hour two: Student Paper Presentations
   (3) Hour three: Student Paper Presentations
xi) Lesson eleven: Case Study
   (1) Hour one: M777, Light Weight Howitzer Overview (DoDI 5000.02, Defense Acquisition Guidebook, case study handout)
   (2) Hour two: Student Activity (course notes and syllabus)
   (3) Hour three: M777, Light Weight Howitzer Student Presentations (course notes, DoD 5000.59M, DoDI 5000.61)
xii) Lesson twelve: M&S System Support (DoDI 5000.02, Defense Acquisition Guidebook, course notes)
   (1) Hour one: Group presentation
   (2) Hour two: Group presentation
(3) Hour three: Group presentation

xiii) Lesson thirteen: M&S

(1) Hour one: Mini Case Study  Environmental Modeling (Student handouts, course notes and syllabus)

(2) Hour two: Case Study Student Presentations (course notes and syllabus)

(3) Hour three: Course Review (course notes and syllabus)

xiv) Lesson fourteen: Examination