BRAC 2005

EDUCATION AND TRAINING JOINT CROSS-SERVICE GROUP

MEETING MINUTES of February 17, 2005

The Principal Deputy Under Secretary of Defense (P&R), Mr. Charles Abell, chaired the 47th meeting of the E&T JCSG. Attendee List is Attachment 1. The following is a summary of discussions (Briefing slides are Attachment 2):

- Mr. Abell opened the meeting by welcoming participants. The E&T JCSG currently has 62 declared scenarios: 13 have been deleted, 36 deactivated, 12 approved and 1 pending further deliberations. It is anticipated that three candidate recommendations will be ready for presentation to the ISG on 4 March 2005. Mr. Abell highlighted the 11 February 2005 ISG meeting where he presented seven E&T JCSG candidate recommendations. The ISG approved all seven but requested follow-up on E&T-0003, "Privatize PDE function at NPS and AFIT" regarding Navy graduate-education concerns.

  Note: Subsequent to this 17 February E&T JCSG meeting, the OSD BRAC advised the E&T JCSG that Mr. Wynne, ISG Chairman, plans to present all seven E&T candidate recommendations as well as other JCSGs' candidate recommendations to the IEC Wednesday, 23 February 2005. Mr. Dominguez, as the acting chair, will represent the E&T JCSG.

- E&T JCSG received an informational briefing on DON rationale for modification to E&T-0003 "Privatize PDE function at NPS and AFIT". RADM Jamie Barnett, N00TB, expressed DON concern that civilian academia does not currently possess an equivalent substitute for eight of the Advanced Academic Degrees (AAD) currently taught at NPS. DON recommended relocation of those degrees to the Naval War College, Newport, RI, using the BRAC 2005 process. Following RADM Barnett's presentation and a spirited discussion, it was clarified that DON did not necessarily want the entire degree program moved but only those courses that were military-unique and could not be easily replicated at a civilian institution. Mr. Abell thanked RADM Barnett for briefing the JCSG and helping them better understand Navy concerns. After RADM Barnett departed, the E&T JCSG Professional Development Education (PDE) Subgroup (Col Lynes) provided a briefing on the eight AAD programs in question to illustrate significant commonalities between the military and civilian academic structures. The E&T JCSG:

- ***Tasked PDE to get clarification from Office of General Council (BRAC Legal Advisor) regarding parameters of BRAC law.*** Specifically, if E&T-0003 becomes a BRAC recommendation, would DON be precluded from establishing, reestablishing, or moving portions of the concerned resident/non-resident grad-ed courses.
- ***Requested the Navy (through the Navy E&T JCSG representative) provide Navy specific grad-ed courses (at the course-level vice degree-level) and proposed faculty cost for subsequent re-examination by the PDE subgroup.***
- ***Deferred further discussion on E&T-0003, "Privatize PDE function conducted at AFIT and NPS" pending OGC opinion and DON listing of specific courses.*** *[NOTE: E&T-0003 is to be briefed to the IEC 23 Feb 05]*

- The Flight Training Subgroup (Col Simmons and CAPT Summerlin) provided an update for E&T-0052 "JSF Stand-Alone / Joint Strike Fighter Initial Training Site". The subgroup compared costs of a basing arrangement that would accommodate separate Pilot Training and Maintenance Training Centers (PTC/MTC) verses an Integrated Training Center (ITC). Mr. Brian Buzzell from OSD BRAC produced a record of staffing action that proclaimed the ITC concept had been directed by Mr. Aldridge.
  - ***The E&T JCSG directed that the E&TCR-0052 "quint-chart" Title and Candidate Recommendation summary blocks be edited to read "Initial Training Site" and include verbiage that the base of choice be sized to accommodate an "Integrated Training Center".*** The Principals noted that this Candidate Recommendation dealt only with the initial JSF Pilot Training/bed down; subsequent JSF ITS or PTC/MTC decisions will occur well after BRAC 2005 and will necessitate re-evaluation.
  - ***Approved E&T 0052,* "Joint Strike Fighter Integrated Training Site" *updated analysis.***

- Mr. Howlett noted that during the previous meeting, the E&T JCSG approved E&T 0032, "Realign SLCs under NDU and co-locate at Fort McNair" to go forward but still had two alternatives as active candidate recommendations in the ISG Scenario Tracker Tool. The E&T JCSG:
  - ***Deactivated E&T 0025, "Realign SSCs in Place."***
  - ***Deactivated E&T 0058, "Realign USAWC and USACG."***

- The E&T JCSG also directed the following:
  - ***Each subgroup is to review scenarios and identify those that may have been prematurely rejected on the basis of low payback and high one-time costs. SST was to specifically re-look DLI.***

- ***Each subgroup was also tasked to identify and monitor their personnel requirements between 16 May and 30 September 2005 and let the E&T JCSG know of any potential problems.***

The next scheduled meeting of the E&T JCSG is Thursday, 3 March 2005.

Approved: _____
Charles S. Abell
Principal Deputy Under Secretary of Defense
(Personnel & Readiness)
Chairman, Education & Training
Joint Cross-Service Group

Attachments:
1. List of Attendees, February 17, 2005
2. Briefing Slides

Copies:
1. OSD BRAC Office
2. E&T JCSG Coordination Team
3. DoD IG

BRAC 2005
EDUCATION AND TRAINING JOINT CROSS-SERVICE GROUP
February 17, 2005

Attendees

Members:

- Hon Charles S. Abell, Principal Deputy Under Secretary of Defense (Personnel & Readiness) Chair
- BG Tom Maffey, USA, JCS VDJ-7
- BGen Thomas Conant, USMC, Deputy Director, Training and Education Command
- BG Louis Weber, Director, Training Army G-3 (DAMO-TR)
- CAPT Bill Wilcox, USN, OPNAV N12B
- Col Joanna Shumaker, USAF, AF DPX

Others:

- Dr. Paul Mayberry, Deputy Under Secretary of Defense for Readiness
- Mr. Jim Gunlicks, USA, Army G-3 (DAMO-TR)
- Mr. Bob Howlett, E&T JCSG Coordination Team
- Ms. Nancy Weaver, E&T JCSG Coordination Team
- Mr. Mark Horn, Ctr., E&T JCSG Coordination Team
- RADM James Barnett, USN, N00TB
- Mr. Frank Petho, USN, N00T
- CAPT Gene Summerlin, USN, NAVY BRAC, Flight Training Subgroup
- Col Jimmie Simmons, USAF, AETC/DOR, Flight Training Subgroup
- Col James Briggs, USAF, AETC/DOO, Specialized Skill Training Subgroup
- Col Jerome Lynes, USMC, JCS/J-7, PDE Subgroup
- CAPT Cathy Osman, USN, JCS/J-7, PDE Subgroup
- Col Mike Massoth, USMC, Deputy Director, Training and Education Command
- Col Samuel Walker, USAF, Professional Development Education Subgroup
- Mr. Bob Harrison, USA, G3 Training
- Mr. Brian Buzzell, OSD BRAC Contract Support
- Ms. Beth Schaefer, DODIG
- Capt Ernest Wearren, USAF, AF-BRAC Office

Attachment (1)

E&T JCSG Principals Meeting

February 17, 2005

Mr. Charles Abell
Chair, E&T JCSG

Agenda

- Overview
- Navy Grad-Ed Concerns
- E&T JCSG Update
  - Calendar of Events
  - Candidate Recommendation Status
  - ISG Feedback
  - Red Team Feedback
- Flight Training Update
- Wrap-up
  - Identification of “minimum critical knowledge base” requirements
  - Scenarios rejected for low pay back

E&T JCSG Schedule – February/March

Monday	Tuesday	Wednesday	Thursday	Friday	Sat	Sun
	1	2 **E&T JCSG** **1300-1530**	3	4 ISG Mtg 1030-1200	5	6
7 E&T POC Mtg	8	9	10 **E&T JCSG** **1300-1530** **(2E223)**	11 ISG Mtg 1030-1200 ***(E&T Briefs - 7)***	12	13
14 **Red Team Session**	15 E&T POC Mtg	16	17 **E&T JCSG** **1300-1530** **(2E223)**	18 ISG Mtg	19	20
21 **President's Day** 	22 E&T POC Mtg	23	24 **E&T JCSG** **1300-1530** **(2E223)**	25 ISG Mtg 1030-1200 *(E&T Briefing - ?)*	26	27
28	1 E&T POC Mtg	2	3 **E&T JCSG** **1300-1530** **(TBD)**	4 (E&T Briefs – *5**)	5	6

E&T JCSG Review

Scenario no.		Status		Candidate Recommendations
E&T-0003	PDE			CR approved, 5 Jan 05/ISG 11 Feb
E&T-0004	SST		Deactivated, 13 Jan 05	
E&T-0005	SST		Deactivated, 6 Jan 05	Contingent to #0053
E&T-0006	FT		Deactivated, 27 Jan 05	
E&T-0007	FT	Deleted		
E&T-0008	FT	Deleted		
E&T-0009	Ranges (T&E)	Deleted		
E&T-0010	Ranges (Tng)		(ON HOLD)	
E&T-0011	Ranges (Tng)	Deleted		
E&T-0012	PDE			CR approved, 19 Jan 05/ISG 11 Feb
E&T-0013	PDE		Deactivated, 12 Jan 05	
E&T-0014	PDE/SST			CR approved, 12 Jan 05/ISG 11 Feb
E&T-0015	PDE/SST		Deactivated, 26 Jan 05	
E&T-0016	SST			CR approved, 12 Jan 05/ISG 11 Feb
E&T-0017	SST		Deactivated, 12 Jan 05	
E&T-0018	SST		Deactivated, 13 Jan 05	
E&T-0019	SST	Deleted		

E&T JCSG Review

Scenario no.		Status		Candidate Recommendations
E&T-0020	FT	Deleted		
E&T-0021	Ranges (T&E)	Deleted	Remanded to T JCSG, 19 Jan 05	
E&T-0022	PDE		Deactivated, 5 Jan 05	Contingent to #0003
E&T-0023	PDE		Deactivated, 5 Jan 05	
E&T-0024	PDE		Deactivated, 2 Feb 05	
E&T-0025	PDE			CR approved, 2 Feb 05
E&T-0026	PDE		Deactivated, 2 Feb 05	
E&T-0027	PDE		Deactivated, 2 Feb 05	
E&T-0028	PDE		Deactivated, 2 Feb 05	
E&T-0029	SST			CR approved 16/21 Dec 04/ISG 11 Feb
E&T-0030	SST		Deactivated, 13 Jan 05	
E&T-0031	SST		Deactivated, 12 Jan 05	
E&T-0032	PDE			CR approved, 2 Feb 05
E&T-0033	PDE		Deactivated, 2 Feb 05	
E&T-0034	PDE		Deactivated, 2 Feb 05	
E&T-0035	PDE		Deactivated, 2 Feb 05	

E&T JCSG Review

Scenario no.		Status		Candidate Recommendations
E&T-0036	PDE		Deactivated, 2 Feb 05	
E&T-0037	Ranges (Tng)			CR approved, 26 Jan 05
E&T-0038	Ranges (Tng)			CR approved, 26 Jan 05
E&T-0039	SST			CR approved, 6 Jan 05/ISG 11 Feb
E&T-0040	SST	Deleted		
E&T-0041	SST		Deactivated, 10 Feb 05	
E&T-0042	SST		Deactivated, 13 Jan 05	
E&T-0043	SST		Deactivated, 12 Jan 05	
E&T-0044	FT		Deactivated, 27 Jan 05	
E&T-0045	FT		Deactivated, 27 Jan 05	
E&T-0046	FT			CR approved, 27 Jan 05
E&T-0047	FT	Deleted	(ISG 14 Jan)	
E&T-0048	FT	Deleted	(ISG 14 Jan)	
E&T-0049	FT		Deactivated, 27 Jan 05	
E&T-0050	FT		Deactivated, 27Jan 05	

E&T JCSG Review

Scenario no.		Status		Candidate Recommendations
E&T-0051	Ranges (T&E)		Deactivated, 26 Jan 05	
E&T-0052	FT			CR approved, 27 Jan 05
E&T-0053	SST			CR approved, 6 Jan 05/ISG 11 Feb
E&T-0054		Deleted * ENTRY ERROR		
E&T-0055	SST		Deactivated, 27 Jan 05	
E&T-0056	SST		Deactivated, 27 Jan 05	
E&T-0057	SST		Deactivated, 27 Jan 05	
E&T-0058	PDE			CR approved, 2 Feb 05
E&T 0059	SST	Deleted, 19 Jan 05		
E&T 0060	SST	Deleted, 19 Jan 05		
E&T-0061	SST		Deactivated, 10 Feb 05	
E&T-0062	SST		Deactivated, 10 Feb 05	
E&T-0063	SST		Deactivated, 10 Feb 05	
E&T-0064	SST		Deactivated, 10 Feb 05	
TOTALS	62	-13	- 34	(12+2) = 14* = 1 pending

ISG & Red Team Feedback

- ISG Meeting, 11 Feb
  - 7 Candidates Recommendations briefed
    - 6 approved for IEC Review (23 Feb)
    - 1 approved pending re-look to address Navy Grad-Ed concerns
  - JPME/PME Strategy briefed—move ahead w/JCSG recommendation

- Red Team Session, 14 Feb
  - Offered suggestions for E&T JCSG consideration
    - Candidate Recommendation justification/final report should include the principals/strategies/ transformational options it advances
    - Surge — benefits in coordinating w/Services on percentages used in analyses
    - Strategies should reflect BRAC guidance and not give the appearance of pre-determined outcomes (Ranges)
  - Additional feedback once all candidate recommendations are briefed

Education & Training
Joint Cross Service Group
Flight Training Subgroup

Update

Candidate Recommendation

E&T 0052, Joint Strike Fighter (JSF) Stand Alone Integrated Training Center

E&T JCSG-FT Remaining Issue

- "Convert JSF Pilot Training Center/Maintenance Training Center (PTC/MTC) Candidate Recommendation to Integrated Training Center"
- Recurring cost does NOT include Contract for Instructors

Cost Comparison ($M)			
	PTC/MTC	ITC	Delta
One-time cost	203.26	199.22	-4.04 ↓
Net Implementation cost	780.63	212.00	-568.63 ↓
Annual Recurring Cost	2.98	3.48	0.50 ↑
Payback Period	Never		
Mil/Civ	555/84	179/21	-376/-63 ↓
NPV Cost	230.16	230.55	0.39 ↑

E&T CR 0052

C6 – Employment Change by Region of Influence

Base	Total Loss/Gain	Direct Loss/Gain	Indirect Loss/Gain	% of ROI Employment
Fort Walton Beach (Eglin AFB)	1,948	1,066	882	1.62%
Pensacola-Ferry Pass (NAS Pensacola)	-1,325	-586	-739	-0.63%
Phoenix-Mesa-Scottsdale (Luke AFB)	-109	-62	-47	-0.01%
San Diego-Carlsbad-San Marcos (Miramar MCAS)	-116	-61	-55	-0.01%
Virginia Beach-Norfolk-Newport News (NAS Oceana)	-128	-62	-66	-0.01%
Wichita Falls (Sheppard AFB)	-487	-295	-192	-0.52%
Aggregate	-217	0	-217	

E&T Candidate Recommendation CR 0052
"Stand Alone" JSF Flying / Maintenance Training Site

Candidate Recommendation: JSF Stand-Alone. Realign Luke AFB, Sheppard AFB, Miramar MCAS, NAS Oceana, and NAS Pensacola by relocating instructor pilots, operations support personnel, maintenance instructors and associated equipment to Eglin AFB, Florida to establish a joint Fleet Replacement Squadron / Formal Training Unit (FRS/FTU) for a USAF, USN, and USMC Joint Strike Fighter (JSF) training organization for aviators and maintenance technicians assigned to this new weapon system.

Justification

- ✓ OSD Direction to nominate installation for JSF Initial Training Site
- ✓ Eglin #1 MilVal Score for JSF Mission
  - ✓ Meets Service-endorsed requirements
  - ✓ Follows services future roadmap
- ✓ Enhance personnel management of JSF Aviators

Payback

✓ One-time cost	$199.22M
✓ Net Implementation cost	$212.00M
✓ Annual Recurring cost	$3.48M
✓ Payback Period	Never
✓ NPV cost	$230.60M

Military Value

- ✓Reduction: Loss of any facility reduces Capacity and Military Value
- ✓MVA Scores:

✓ Eglin AFB	74.49	✓NAS Meridian	67.59
✓ C-Point MCAS	73.58	✓Randolph AFB	66.43
✓ Laughlin AFB	72.27	✓Shaw AFB	66.15
✓ Tyndall AFB	70.61	✓Yuma MCAS	61.84
✓ NAS Pensacola	70.06	✓Beaufort MCAS	61.59
✓ Vance AFB	70.00	✓Moody AFB	60.90
✓ Columbus AFB	69.36	✓Sheppard AFB	59.69
✓ NAS Kingsville	68.76		

Impacts

- ✓Criteria 6: -109 to –1,325 jobs; 0.01 to 0.63%
- ✓Criteria 7 - No Issues
- ✓Criteria 8 - No Known Impediments

✓Strategy	✓Capacity Analysis / Data Verification	❑ JCSG/MilDep Rec'd	✓De-conflicted w/JCSGs
✓COBRA	✓Military Value Analysis / Data Verification	✓ Criteria 6-8 Analysis	✓ De-conflicted w/MilDeps

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  - Identification of “minimum critical knowledge base” requirements
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Proposed Scenario E&T-0003A Privatize Graduate Education; Relocate Eight Warfighting Essential Curricula to Newport

DON Rationale

17 February 2005

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Combat Effectiveness Curricula

Privatize all NPS curricula except:

retain and relocate the eight warfighting essential curricula to Newport,

leveraging the Naval War College, Naval Undersea Warfare Center and private educational institutions

Combat Systems
Joint C4I
Information Warfare
Operational Logistics
Information Systems Operations
Undersea Warfare
Information Systems Technology
Special Operations

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The DON Request

- **Special Assistant to the SECNAV memo 1 Feb**
- **Amend E&T-0003 to realign the military specific graduate degree programs / courses of instruction from Naval Postgraduate School to Naval Station Newport, RI.**
- **Current enrollment**
  - **168 Navy**
  - **88 Other US Military**
  - **55 International Military**

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DON Concerns E&T-0003

- **These curricula increase combat effectiveness.**
  - **They are unique warfighting, operational combat programs.**
  - **They are not available in CIVINS.**
  - **We want to retain a rapid, flexible response capability.**
  - **We want to retain a unique pool of specialists.**
  - **Deployable in support of operational units.**
  - **SECNAVINST 1524.2A**
- **Many of these curricula address Information Warfare.**
  - **Center of Excellence for Information Operations**
  - **DEPSECDEF memo of 3 Sep 04**
    - **Develop Information Operations as core military competency.**
- **Educational Responsiveness to Military Requirements**
  - **Align admissions and calendar with military personnel management requirements**
  - **Resident interaction with international military officers**

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Warfighting Programs

- Combat Systems
- Joint Command, Control, Communications, Computers, and Intelligence
- Information Warfare
- Operational Logistics
- Information Systems Operations
- Undersea Warfare
- Special Operations
- Information Systems Technology

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Military Content

- Information Warfare – 47.2%
- Special Operations – 45.8%
- Information Systems Operations – 36.7%
- Undersea Warfare – 31.3%
- Joint Command, Control, Communications, Computers, and Intelligence – 25.0%
- Operational Logistics – 24.4%
- Combat Systems – 22.2%
- Information Systems Technology – 6.7%

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Sample Warfighting Courses

- Guerrilla Warfare [DA XXXX (4-0)]
- Combat Systems Simulations [SE 2911 (4-3)]
- Physics of Underwater Weapons [PH 3479 (4-0)]
- Weapons and Effects [SE 3800 (4-0)]
- Explosives [PH 4171 (4-0)]
- Lethality and Survivability [(PH 4858 (4-0)]
- Military Satellite Communications [SS 3613 (3-0)]
- Combat Analysis for C4I [CC3102 (4-0)]
- Information Warfare Targeting [IW 3920 (3-2)]
- Information Warfare Systems Engineering [IW 4500 (3-2)]
- USW Modeling and Simulation [UW 3303 (4-1)]
- C4I Systems Engineering [CC 4101 (4-2)]
- Signals Intelligence Systems [EC 3750 (3-2)]

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Newport Scenario Synergies

- **Naval Undersea Warfare Center**
  - Full-spectrum research, development, test and evaluation, engineering and fleet support center.
  - People
    - 2,000 people
    - 148 hold doctorates in Information Systems; Sensors Electronics, and Electronic Warfare; and Weapons and Armaments.
  - Laboratories
- **Naval War College**
  - Educational administration
  - Intermediate Service College

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Summary

- Retain eight warfighting curricula.
- Moving these eight curricula to Newport saves vast amounts of money and exploits existing facilities and capabilities.
- No mission creep because:
  - Comprehensive resident graduate education is no longer affordable.
  - E&T-0003 will allow DON to divest itself of infrastructure.
  - It is our intent to strictly limit resident graduate education.

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E&T JCSG 0003 Reassessment

- Acceptable
  - Transformational Option #34: Privatize Graduate Level Education (Mr. Wynne Memo, 8 Sept 04)
- Suitable
  - Approved by E&T JCSG 5 Jan 05; Approved by ISG 11 Feb 05
- Feasible
  - 8 USN Advanced Academic Degree Programs in question

Information Systems Technology

1ST QTR	**IS-2020** Visual Basic	**CS-3030** Computer Architecture and Op Systems	**OS-3105** Statistics for Technical Management	**NW-3230** Strategy And Policy	
2nd QTR	**IS-3020** Software Design	**IS-3201** **Database**	**IS-3502** Computer Networks	**OS-3004** **Operations Research for Computer Systems**	
3rd QTR	**CC-3000** **Intro to C4I**	**IS-3301** **Decision Support Systems**	**IW-3101** Principles of Information Operations	**MO-1901** Mathematics for ISSO	
4th QTR	**EO-2514** Intro to Comm System Engineering I	**SS-3011** Space Technology Applications	**CS-3600** Intro to Computer Security	**GB-3510** Financial Mgmt in the Armed Forces	**MN-4125** Managing Planned Change in Complex Org
5th QTR	**E0-3514** Intro to Comm Systems Engineering II	**IS-4300** Software Engineering and Management	**IS-4031** **Information Systems Evaluation**	**PH-3052** Physics of Space and Airborne Systems	**IS-3333** Intro to Thesis Research
6th QTR	**EO-4514** Comm System Analysis	**IS-0810** Thesis Research	**IS-4220** **Architecting Information Systems**	ELECTIVE	
7th QTR	**IS-0810** Thesis Research	ELECTIVE	**CC-4221** C4ISR SYSTEMS	**MN-3331** **Principles Acquisition Management**	
8th QTR	**IS-0810** Thesis Research	**IS-4182** Information Systems Management	ELECTIVE	ELECTIVE	

Information Systems and Operations

1ST QTR	**MA1901** Mathematics for ISSO	**IS3001** Computer and Software Technology	**IW3101** Principles Of Information Operations		**NW-3230** Strategy And Policy
2nd QTR	**OS2100** Probability & Statistics	**EO3502** Telecommunications Systems Engineering	**IS3502** Computer Networks	**SO3101** Warfare In The Information Age	
3rd QTR	**OS3000** Operations Analysis	**CS3600** Information Assurance	**IS3302** Decision Support & Databases	**CC3000** Intro Command And Control	**NW-3275** Joint Maritime Operations Part 1
4th QTR	**IS0810** Thesis	**SS3011** Space Technology And Applications	**IO4300** Information Operations Planning And Execution	**SO4450** Analytical Methods	**NW-3276** Joint Maritime Operations Part 2
5th QTR	**IS0810** Thesis	**CC4221** C4ISR Systems	**SO4104** Militaries & Technological Change	**OS3603** Simulation and War Gaming	**NW-3285** National Security Decision Making
6th QTR	**IS0810** Thesis	**IS0810** Thesis	**EO3921** SIGINT for the Warfighter	**IO4500** Information Operations Strategies	

Information Warfare

1ST QTR	**MA2139** Introduction Differential Equations and Vector Analysis	**CS2971** Introduction to Object-Oriented Programming In C++	**IW310** Principles of Information Operations		**NW-3230** Strategy And Policy
2nd QTR	**MA3139** Fourier Analysis and Partial Differential Equations	**OS3104** Statistics for Science and Engineering	**CS3030** Computer Architecture and Operating Systems	**EO2652** Field, Waves, and Electromagnetic Engineering	
3rd QTR	**OS3003** Operations Research for Information Warfare	**EO2512** Introduction to Communications	**EO3602** Electromagnetic Radiation, Scattering & Propagation	**PH3998** Information Warfare Targeting	
4th QTR	**EO4612** Microwave Devices and Radar	**CS3600** Computer Security	**EO3512** Communication and Countermeasures I	**PH2203** Waves & Optics	
5th QTR	**EO3911** Fiber Optics Systems	**EO4512** Communication and Countermeasures II	**EC3750** SIGINT Systems	**EO4622** EW for Info Warfare	
6th QTR	**OS3403** Human Factors in Information Warfare	**EC3760** Network Operating Systems	**SO3101** Warfare in the Information Age	**IW0810** Thesis Research	
7th QTR	**EC4010** Principles of Sys Engineering	Elective I	Elective II	**IW0810** Thesis Research	
8th QTR	**IO4300** IO Campaign Planning	Elective III	**IW0810** Thesis Research	**IW0810** Thesis Research	

JC4I Systems

1ST QTR	**CC3000** Introduction to Command, Control, Communication, Computer and Intelligence Systems in DoD	**CC2041** Introduction to Systems Technology Battle Lab	**CI9008** Computer & Software Technology	**MO1901** Mathematics	**NW-3230** Strategy And Policy
2nd QTR	**CC3101** Combat Analysis for C3	**SS3011** Space Systems	**OS3104** Statistics for Science and Engineering	**CS3600** Computer Security	**EO2513** Intro to Communication System Engineering
3rd QTR	**IW3101** Introduction to Information Operations	**OS3008** Analytical Planning Methodology	**PH3052** Sensors	**EO3513** Communication Systems Engineering: Modulation	
4th QTR	**CC4101** C4I Systems Engineering	**IS3302** Decision Support and Database Systems	**IS3502** Computer Networks (LAN/WAN)	**EO4513** Communication System Analysis	
5th QTR	**CC4221** C4ISR	**MN3316** Acquisition Management	**CC3041** Intro to Joint C2 Systems	Elective	**CC0810** Thesis
6th QTR	**CC4041** Advanced Joint C2 Systems Lab	**CC4750** Military C4I Systems & Networks	**CC4103** C4I Systems Evaluation	**CC0810** Thesis Research	
7th QTR	**CC4913** Policies and Problems in C3	**CC0810** Thesis Research	Elective	Elective	

Operational Logistics

1ST QTR	**OA2200** Computational Methods for Opns Research I	**MA1115** Statistics	**MA3042** Linear Algebra	**OA3101** Probability	
2nd QTR	**OA3200** Computational Methods for Opns Research II	**OA3304** Decision Theory	**OA3610** Introduction to Naval Logistics	**OA3102** Statistics	
3rd QTR	**OA3201** Linear Programming	**OA4611** Joint/Combined Logistics	**OA3301** Stochastic Models I	**OA3103** Data Analysis	
4th QTR	**OA3501** Inventory I	**OA3302** OA System Simulation	**OA4201** Nonlinear Programming	**OA4655** Joint Combat Modeling	
5th QTR	**OA4202** Network Flows and Graphs	**OA4501** Supply Systems Seminar	Experience Tour (Off Campus)		
6th QTR	**OA4612** Logistics Models	**NW-3275** Joint Maritime Operations Part 1	Elective	**OA0810** Thesis Research	
7th QTR	**OA4801** Modeling for Military Operations Research	**OA4604** Wargaming Analysis	**NW-3276** Joint Maritime Operations Part 2	**OA0810** Thesis Research	
8th QTR	Elective	**OA4602** Joint Campaign Analysis	**NW-32785** National Security Decision Making	**OA0810** Thesis Research	

Undersea Warfare

1ST QTR	**MA1115/6** Mullti-Var Calculus	**MA2121** Ordinary Diff Eqns	**EO2402** Intro Linear Systems	**NW-3230** Strategy And Policy	
2nd QTR	**OS2103** Applied Prob	**OC3230** Descriptive Phys Ocn	**EO3402** Signals & Noise	**MA3139** Fourier Anal & PDEs	
3rd QTR	**OS3604** Decision & Data Anal	Elective	**UW3303** UW Model & Sim	**NW-3210** National Security Decision Making Part 1	
4th QTR	**OA3602** Search & Detection	**OC3260** Sound in the Ocean	**OC/MR3522** Remote Sensing	**NW-3211** National Security Decision Making Part 2	
5th QTR	**OA4607** Tact Decision Making	**PH3002** Non-acoustic Sen & Sys	**UW3301** UW in 20th Century	Elective	**NW-3270** Joint Maritime Operations Part 1
6th QTR	**XX0810** Thesis Research	**OC4270** Tactical Oceanography	**EC4450** Sonar Systems Eng	Elective	**NW-3271** Joint Maritime Operations Part 2
7th QTR	**XX0810** Thesis Research	**PH3479** Phys of UW Weapons	Elective	Elective	**NW-3272** Joint Maritime Operations Part 3
8th QTR	**XX0810** Thesis Research	**XX0810** Thesis Research	Elective	Elective	

Combat Systems Science and Technology

1st QTR	**PH1994** Special Topics I	**PH1995** Special Topics II	**PH1121** Mechanics I	**SE2911** Combat Systems Simulations	**EC1010** MATLAB
2nd QTR	**PH3991** Theoretical Physics	**PH1322** E&M I	**PH2151** Particle Mechanics	**PH2724** Thermodynamics	**PH2001** Research Seminar
3rd QTR	**PH2652** Modern Physics	**PH2351** E&M II	**PH3152** Mechanics III	**SE2013** Analog Techniques	**PH0999** Physics Colloquium
4th QTR	**PH3655** Solid State Physics	**PH3352** E&M Waves	**PH3292** Physical Optics	**SE3014** Digital Techniques	**PH0999** Physics Colloquium
5th QTR	**PH4656** Quantum Mechanics	Concentration	**SE3172** Fluid Dynamics	**SE4015** Autonomous Robots	**PH0999** Physics Colloquium
6th QTR	**SE3400** Underwater Acoustics	**NW-3230** Strategy And Policy	**SE4860** Missiles	Concentration	**PH0999** Physics Colloquium
7th QTR	Concentration	Thesis	**SE3800** Weapons and Effects	Thesis	**PH0999** Physics Colloquium
8th QTR	**SE4022** Combat Systems Capabilities	Thesis	**SE3200** E&M Sensors	Thesis	**PH4001** Thesis Presentation

E&T JCSG 0003 -- Recommendation

- No modification of 0003 required
  - Overwhelming majority of the coursework for these courses available at civilian universities or DoD institutions
  - Alternate sites for these Advanced Academic degrees already exist