AC 2011-126: SOLDIER TO ENGINEER: FROM THE BATTLEFIELD TO THE CLASSROOM

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Abstract

With the passage of the Post-9/11 Veterans Education Assistance Act of 2008 it is expected that more veterans will consider pursuing a college education upon their separation from the military. This expectation means, “higher education must act immediately to develop programs that more effectively promote access and success for this underrepresented group.”\(^2\) It also means “a seamless transition from the battlefield to the classroom is needed.”\(^2\)

In November 2008 the American Council of Education (ACE) released an Issue Brief, entitled Serving Those Who Serve: Higher Education and American’s Veterans. In this report, ACE, identified the issues facing higher education “on the cusp of serving more than 2 million military veterans as they return from the Afghanistan and Iraq wars.”\(^2\) The Issue Brief also identified “factors that positively affect veteran participation in higher education—namely, greater access to accurate and timely information; streamlined processes for accessing education benefits; academic credit for military training and experience; and transitional support programs on college campuses.”\(^2\) Based on focus groups conducted by ACE, veteran’s reported finding institutions that recognize their military training and experience during the admissions process was difficult. They return from serving our country with weeks, hours and months of military course credit, on-the-job training only to be told there is little to no equivalency for their experience as it relates to pursuing an engineering degree. In many cases veterans were compared to traditional students and given little to no credit for “the range of experiences and leadership skills the veteran will bring.”\(^1\)

This paper presents the efforts of the authors to understand and propose a system to shorten the time to degree in Engineering at the bachelor’s level. Utilizing existing resources such as American Council on Education College Credit for Military Experience and the DANTES College Credit-by-Examination Programs the authors will provide strategies to determine equivalencies for courses in the engineering curriculum. Schools and colleges of engineering must actively and aggressively look at their curricula and find ways to make engineering more attractive to Post 9/11 Veterans.

Introduction

As the engineering community continues its efforts to increase the number of students pursuing engineering degrees it has continued to reach out to populations traditionally underrepresented. Included in this population are women, persons with disabilities and members of racial and ethnic minorities. A group often overlooked that has gained attention lately is veterans. With the 2008 introduction and the 2009 launch of the Post-9/11 GI Bill, this underserved is new population requiring attention.

The Post-9/11 GI Bill provides financial support for education and housing to individuals with at least 90 days of aggregate service on or after September 11, 2001, or individuals discharged with a service-connected disability after 30 days.\(^5\) To receive this benefit veterans
must have been honorably discharged. This benefit can be used for vocational/technical training or pursuit of undergraduate and graduate degrees.

This is a desirable population for the engineering community for many reasons. First, they are a large untapped population; the Department of Veteran’s Affairs (VA) estimates that 2.1 million of today’s veterans served on active duty at least 30 days. Second, the diversity those veterans bring. More than 14 million active duty members are women, 30% come from racial minority groups and 10% are Hispanic. In 2008, more than 93% of active-duty enlisted members were high school graduates, while 6% had GEDs. Third a large number of the population has engineering or technology related occupations.

According to the Veterans’ Education for Engineering Science Report published by the National Science Foundation (NSF), many vets have an interest an experience in technical fields. The 2008 population representation in military services fiscal report stated that the most common occupation for men is ‘electrical’ (22%). For women the most popular occupation is ‘administration’ (32%) with 11% in the ‘electrical’ area. For active duty commissioned officers the most popular occupations for men are ‘tactical operations’ (43%) and ‘engineering and maintenance’ (14%). For active duty commissioned women it is ‘healthcare’ (41%) and ‘engineering and maintenance’ (10%).

Walker reported that although 17% of the enlisted members serve in communications or electronics fields only 4% of the Post-9/11 go into computer and mathematical occupations. One reason for this low rate is the difficulty veterans face in transferring military training to academic credits. The ACE published report, Service Members in School, Military Veterans’ Experiences Using the Post-9/11 GI Bill and Pursuing Postsecondary Education, found that 57% of survey respondents said they attempted to transfer military credits to academic credits. Of this group only 47% were satisfied with the result. While no data exists for the percentage who attempted to pursue STEM disciplines it is expected to be a respectable number given that 35% of enlisted members serve in a technical field (e.g. electronics, communication, medical services).

According to Kiley, veterans say they encounter barriers getting course credit for skills they learned during military training, such as language or technical programs. In his article, Veterans and Colleges Say They’re Satisfied With New GI Benefits, in Spite of a Rough First Year, Kiley provided the following example illustrating the problem encountered.

“Ms. Steele described the experience of husband and wife veterans who had both undergone extensive foreign-language training while in the service and were enrolling at the same university. The wife couldn't transfer credit for her military training to course credit, but her husband, who had studied a different language, did get transfer credit from another department of the institution.”

This phenomenon is not isolated to languages. Based on focus groups conducted by Steele et. al, veterans reported finding institutions that recognize their military training and experience during the admissions process was difficult. In many cases veterans were compared to traditional students and given little to no credit for “the range of experiences and leadership skills the veteran will bring.” As Associate Dean for Undergraduate Studies, the co-author experienced this across engineering disciplines at the home institution. For the reasons cited here and in
effort to increase receptiveness to veterans the authors set out to understand and propose a system to shorten the time to degree in Engineering at the bachelor’s level.

Background

In order to understand and propose a system to shorten time to attainment of an engineering degree, the authors sought to fully understand the current system for determining credit for military training and service and establishing course equivalences. The authors contacted ACE, managers of the College Credit for Military Experience Program and publishers for the Guide to the Evaluation of Educational Experiences in the Armed Services (the Guide). The authors contacted ACE, managers of the College Credit for Military Experience Program and publishers for the Guide to the Evaluation of Educational Experiences in the Armed Services (the Guide). 2

ACE has reviewed courses and offered credit recommendations since the early 1940s and has evaluated military occupations since 1974. 2 Over 2,200 colleges and universities use the ACE Military Program course recommendations to grant credit to veterans seeking to transfer to their institution. 2 ACE has also offered the Guide for over 50 years to monitor learning acquired through the military. 2 The Guide is an online tool used to summarize learning outcomes, methods of instruction, course length and offer credit recommendations for military courses, for all service branches. The Guide was initially developed to provide an evaluation structure to counter the education community’s granting of credit to World War I veterans as a reward for length of service. Today it serves as a resource for both service members and university officials to present course credit equivalences for military training.

Although the Guide is maintained by ACE, subject matter experts evaluate the courses. Experts are typically college or university professor or administrators, or members of disciplinary societies, education associations, and accrediting associations who are currently teaching. Once selected, experts are assembled into evaluation teams whose job it is to conduct visits and examine course materials including: course syllabus, training materials, tests, textbooks, technical manuals, and examinations. On occasion evaluators interview instructors and program administrators, observe lectures, and examine instructional equipment and visit laboratories. It is important to note that each individual service branch manages all courses.

With regards to the evaluation of occupations the process is equally rigorous. The evaluators must first identify the skills, competencies, and knowledge associated with a given occupation specialty. The occupational materials relevant to the evaluation are made available to staff members and evaluators by each service branch. For example, the Navy provides official manuals that describe the duties and qualifications for each occupation; the Bibliography for Advancement Study, rate training manuals, and other publications used by Navy enlisted men and women in the day-to-day performance of their duties and to prepare for their advancement examinations; and the advancement examination.

The evaluators review the job description, job task analysis, exams (when available), and manuals used on the job prior to their visit. On-site they interview service members from various ranks within an occupation. The purpose of the on-site visit and subsequent interview is to validate responsibilities, functions, duties and the percentage of time spent performing each of them.
As described by Cynthia Bruce, Associate Director of Military Evaluation at ACE, both course and occupation evaluation visits functions like an ABET visit. Upon the conclusion of their visit and evaluation the evaluators determine the number of credits to be associated with each course and prepare a description of each course and occupation.

Figures 1 and 2 provide samples of a course exhibit and an occupation exhibit respectively. Course exhibits contain a number of sections and are presented in a consistent manner for all service branches. As can be seen in Figure 1, the exhibit contains a lot of useful information for those evaluating a student’s portfolio (e.g. learning outcomes, length of course, type of instruction, and credit recommendations) and is structured the same for all services. Within the credit recommendation section the evaluators also offer a recommendation for academic level. Academic levels range from vocational certificate to graduate degree. Vocational certificate is intended for work that is usually a year or less in length and designed to provide students with occupational skills. Lower-Division Baccalaureate/Associate Degree is intended for introductory coursework covered in the first two years. Upper-Division Baccalaureate is intended for coursework in the last two years of a degree program and specializes theoretical or analytical material. Graduate Degree is intended for those courses that require independent study, original research, critical analysis, and the scholarly and professional application of the specialized knowledge or discipline.

Figure 2 contains similar information. It provides the title for the position, a description of the duties preformed, and recommendations on skill levels expressed in semester hours. Similar to the course exhibit it is presented in one of the four academic levels ranging from vocational certificate to graduate degree.
**Sample Course Exhibit**

<table>
<thead>
<tr>
<th>ID Number</th>
<th>A ten-character code assigned by ACE to identify each course exhibit.</th>
</tr>
</thead>
<tbody>
<tr>
<td>AR-1401-0033</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Military Course Number</th>
<th>The number assigned to the course by the service school, as indicated on the program of instruction. Listed by version, if appropriate.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. FINANCE SPECIALIST</td>
<td></td>
</tr>
<tr>
<td>2. FINANCIAL MANAGEMENT TECHNICIAN (Finance Specialist)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Course Number</th>
<th>Version 1: 542/73C10; Version 2: 542/73C10 (ST)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location</td>
<td>Version 1: Finance School, Soldier Support Institute, Fort Benjamin Harrison, IN. Version 2: Soldier Support Institute, Fort Jackson, SC, Finance School, Soldier Support Institute, Fort Benjamin Harrison, IN, Finance School, Fort Jackson, SC.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Length</th>
<th>The length of the course in weeks, with contact hours in parentheses. Listed by version, if appropriate.</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Learning Outcomes</th>
<th>Competencies students acquire during the course. Some courses prior to 1990 have Objectives. Listed by version, if appropriate.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Learning Outcomes</td>
<td>Version 1: Before 10/86 see AR-1401-0002. Upon completion of the course, the student will be able to identify and determine the types of incentive pay plans, prepare pay vouchers, complete pay documents, and compute pay allowances. Version 2: Upon completion of the course, the student will be able to determine pay status and adjustments, compute payroll and travel allowances, prepare pay and travel vouchers, process pay inquiries, and access and input data on computer.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Instruction</th>
<th>Description of instruction, including teaching methods, facilities, equipment, and major subject areas covered. Listed by version, if appropriate.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Instruction</td>
<td>Version 1: Methods of instruction include lectures, role playing, and in-class exercises. Topics covered include financial operations, data entry operations, and payroll processing. Version 2: Methods of instruction include lectures, role playing, and in-class exercises, and computer based instruction. Topics covered include financial operations and payroll processing.</td>
</tr>
</tbody>
</table>

| Credit Recommendation | Version 1: In the vocational certificate category, 2 semester hours in payroll accounting. In the lower-division baccalaureate/associate degree category, 1 semester hour in computer applications (501) | Version 2: In the lower-division baccalaureate/associate degree category, 2 semester hours in payroll accounting, and 1 in computer applications (404) |

<table>
<thead>
<tr>
<th>Related Occupations</th>
<th>A cross reference to related Army MOS exhibits. Officials awarding credit for a course and any MOS should compare the exhibit for the course with that of the MOS before awarding credit. This paragraph is included only for Army-sponsored courses only.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Related Occupations</td>
<td>44C, 73C.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Title</th>
<th>The title of the course as provided on the service school’s program of instruction. Version 1 is the oldest. If the titles are the same for all versions, then the version number is omitted.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Title</td>
<td>Sample Course Exhibit</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Salient</th>
<th>Salient factors are in parentheses, and are typically the titles of previous versions if there has been a change in the course title.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Salient</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Location</th>
<th>The service school, military installation, and state. Listed by version, if appropriate.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Exhibit Dates</th>
<th>Training start date on materials evaluated and, if applicable, the date the training was eliminated. “Present” denotes that the training is still ongoing. Listed by version, if appropriate.</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Recommendation</th>
<th>Expressed in semester hours and recommended in four categories: vocational certificate, lower-division baccalaureate/associate degree, upper division baccalaureate, and graduate. Listed by version, if appropriate.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recommendation</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Team Review Date</th>
<th>Date when the course was last evaluated by a team of faculty members drawn from academia. This information is particularly useful in subject areas where state-of-the-art is important in determining the applicability of credit. ACE’s policy is that Team Reviews must occur at least every ten years.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Team Review Date</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Review Date</th>
<th>Most recent date the course was reviewed, either by an academic team or in-house by ACE (in-house reviews are conducted when changes to course content are minor).</th>
</tr>
</thead>
<tbody>
<tr>
<td>Review Date</td>
<td></td>
</tr>
</tbody>
</table>
**Figure 2. Sample Occupational Exhibit**

### Sample Army Enlisted MOS Exhibit

**ID Number.** A nine-character code assigned by ACE to identify each MOS exhibit.

**MOS Designation.** The five-character codes that identify the MOS and each of its skill levels. An MOS may have as many as five skill levels (e.g., Skill Levels 10, 20, 30, 40 and 50) or as few as one.

**Career Management Field.** Two digits and a title designating a group of related MOS’s; if divided into subfields (three digits and a title), the subfield is also provided. When a person has held more than one MOS in the same career management field or subfield, you should be alert to the possibility of overlapping recommendations.

**Description.** A summary description applying to all skill levels and a specific description for each skill level. Provides information about the duties performed and the qualifications required for proficiency in the MOS. It indicates the rationale behind a given recommendation and provides information that can be used as a starting point should you wish to conduct further assessment of the learning a soldier or veteran has acquired. The description is also useful in making decisions when recommendations from more than one learning experience appear to duplicate each other.

**Team Review Date.** Date when the skill level was last evaluated by a team of faculty members drawn from academia. This information is particularly useful in subject areas where state-of-the-art is important in determining the applicability of credit. ACE’s policy is that Team Reviews must occur at least every ten years.

**MOS-63S-002**

**Heavy Wheel Vehicle Mechanic**

- 63S10
- 63S20

**Exhibit Dates:** 8/92-8/04.

**Career Management Field:** 63 (Mechanical Maintenance).

**Description**

**Summary:** Performs maintenance on heavy wheel vehicles and material-handling equipment. **Skill Level 11:** Replaces engine components such as fuel pumps, generators, starters, regulators, radiators, universal joints, brake shoes, engine mounts, and lines and fittings; adjusts operating mechanisms; prepares maintenance forms and records. **Skill Level 20:** Able to perform the duties required for Skill Level 10; provides technical guidance and supervision to subordinates; troubleshoots and uses diagnostic equipment to identify malfunctions; interprets complex schematic diagrams; completes maintenance forms and records; conducts on-the-job training.

**Recommendation, Skill Level 10**

Credit may be granted on the basis of individualized assessment of the student (8/92) (3/94).

**Recommendation, Skill Level 20**

In the lower-division baccalaureate/associate degree category, 3 semester hours in diesel fuel systems, 3 in electrical systems, 3 in brake systems, 3 in heavy duty drive trains, 3 in diesel engine fundamentals, 3 in military science, and 3 in personnel supervision. (NOTE: This recommendation for skill level 20 is valid for the dates 8/92-2/95 only) (8/92).

**Title.** The official Army title of the MOS during the period of the exhibit dates. If the title changed during that period, the newer title is given first and the older title is given in parentheses on the next line.

**Exhibit Dates.** Start and end dates by month and year. When an end date is given, the MOS was either discontinued (an explanation is provided) or changed (in which case another exhibit will follow for the MOS, e.g., MOS-63S-003). An end date of “Present” indicates that the MOS still exists. “Pending Evaluation” means that the MOS is scheduled to be evaluated.

**Recommendation.** By skill level. Only the recommendation for the highest skill level held should be used; skill-level recommendations should not be added. Educational credit is expressed in semester hours and recommended in four categories: vocational certificate, lower-division baccalaureate/associate degree, upper-division baccalaureate, and graduate degree.

**Review Date.** Most recent date the skill level was reviewed, either by an academic team or in-house by ACE (in-house reviews are conducted when changes to skill level content are minor).
To provide engineering examples, the authors searched both the course and occupational databases using “engineering” as a keyword for all branches. The search revealed 161 courses containing the word engineering and 63 occupations. Examples of course exhibits can be seen in Figures 3, 4, and 5.

Figure 3. Electrical Engineering Course Exhibit

**Course Exhibit**

**AF-1715-0164**

**Electrical Engineering**

**Course Number:** None.

**Location:** Institute of Technology, Wright-Patterson AFB, OH.

**Length:** 4 weeks (240 hours).

**Exhibit Dates:** 4/73–6/74.

**Objectives:** To provide electrical engineers with advanced training in electrical power systems design.

**Instruction:** Lectures in one- and three-phase circuits; power-factor corrections; voltage regulations; load flow, fault calculations, and grounding methods; various fuses, circuit breakers, and relays; transformer characteristics; lighting methods; operation and applications of various AC and DC motors; systems design; utility management and planning; and national electric code regulations and practices.

**Credit Recommendation:** In the lower-division baccalaureate/associate degree category, 4 semester hours in electronics. In the upper-division baccalaureate category, 3 semester hours in electronics (3/74)(3/74).

It is interesting to note that a student completing this four-week course at Wright-Patterson Air Force Base has spent 240 hours in class on these topics while a traditional student who enrolls in a typical three credit course, which meets for 50 minutes three times per week, has spent approximately 37.5 hours in class and on average 120 hours on course material outside of class, totaling 157.5 hours.
Course Exhibit

AF-1601-0044

Base Civil Engineer
(Basic Installations Engineering Officer)

Course Number: None.

Location: Institute of Technology, Wright-Patterson AFB, OH.

Length: 8–9 weeks (233–243 hours).

Exhibit Dates: 1/54–12/68.

Objectives: To train officers in civil engineering management.

Instruction: Lectures and practical exercises in civil engineering management, including functions of the Air Force civil engineer, supervisory management, real estate administration, fiscal budgeting, maintenance management and control, engineering contracts, installations planning and military construction programs, peroperations and maintenance programming and project methodologies, comprehensive problems, security indoctrination, arctic orientation and construction techniques, and nuclear effects and recovery planning.

Credit Recommendation: In the lower-division baccalaureate/associate degree category, 2 semester hours in civil engineering management. In the upper-division baccalaureate category, 3 semester hours in business management and organization (8/74)(8/74).

This exhibit was last updated on 9/10/2010
In the course credit determination process evaluators consider only the competencies, which can be equated with civilian postsecondary curricula. Occupational credit recommendations are based on the skills, competencies, and knowledge gained, as demonstrated through proficiency rather than a focus on how much time spent during the learning process. Figure 6 provides an example of an occupational exhibit.
Figure 6. Aircraft Electrician Occupational Exhibit

**Occupation Exhibit**

**MOS-15F-003**

**AIRCRAFT ELECTRICIAN**

15F10
15F20
15F30

**Exhibit Dates:** 4/03–Present.

**Career Management Field:** 15 (Aviation).

**Description**

**Summary:** Supervises or performs maintenance on aircraft electrical/electronic systems and aircraft crew station instruments. **Skill Level 10:** Removes and replaces electrical/electronic elements of assemblies and components, including electrical wiring, aircraft battery systems, and instruments; applies proper soldering techniques during circuitry repair; cleans, preserves, and stores electrical/electronic components and aircraft instruments; uses and maintains common and special tools; maintains and repairs ground support equipment; uses aircraft forms and records; prepares requests for turn-in and repair parts. **Skill Level 20:** Able to perform the duties required for Skill Level 10; provides technical guidance to subordinates; applies troubleshooting techniques to diagnose and localize malfunctions to specific electrical/electronic components including solid state and transistorized subsystems; disassembles, repairs, reassembles, adjusts, and tests electrical/electronic elements of assemblies and components; applies principles of pneumdraulics to troubleshooting of interfacing electropneumdraulic systems and components; repairs and replaces printed circuits; repairs nickel cadmium batteries; performs maintenance on diagnostic equipment; prepares forms and records. **Skill Level 30:** Able to perform the duties required for Skill Level 20; may serve as technical inspector; plans work flow; applies production control, quality assurance and other maintenance management principles; supervises and evaluates work performance; conducts on-the-job training; monitors shop and flight-line safety.

**Recommendation, Skill Level 10**
Credit may be granted on the basis of an individualized assessment of the student (6/02)(4/04).

**Recommendation, Skill Level 20**
Credit may be granted on the basis of an individualized assessment of the student (6/02)(4/04).

**Recommendation, Skill Level 30**
In the lower-division baccalaureate/associate degree category, 3 semester hours in aircraft maintenance fundamentals, 3 in AC/DC circuit analysis, 3 in electronic devices and circuits, 3 in electronics systems troubleshooting and repair, 3 in principles of supervision, 1 in introduction to computers, 1 in computer applications, 3 in maintenance management, 2 in records management, and 2 in aviation safety (6/02)(4/04).

**THIS EXHIBIT WAS LAST UPDATED ON 9/23/2010**
In a search of a few select ABET accredited programs; the authors were able to identify comparable engineering courses at some of these institutions. While these courses are not identical to the ones identified by ACE, they do cover similar topics and demonstrate that it is possible to identify equivalent courses if given some flexibility. Course descriptions of these classes are provided in Table 1 below.

Table 1. Sample Course Descriptions

<table>
<thead>
<tr>
<th>University</th>
<th>Course</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Virginia Tech</td>
<td>Introduction to Power Systems</td>
<td>Basic concepts of AC systems, single-phase and three-phase networks, electric power generation, transformers, transmission lines, electric machinery and the use of power. Major Measurable Learning Objectives: • apply the basic principles of circuit analysis to AC networks • apply phasor representation to solve AC networks • solve the network and evaluate performance of single-phase and three-phase networks • determine the equivalent circuit of single- and three-phase transformers • apply the principles of electric machines and their control, • apply AC circuit analysis techniques to transmission lines and interconnected power networks.</td>
</tr>
<tr>
<td>Virginia Tech</td>
<td>Electric Power Laboratory</td>
<td>Laboratory experiments based on principles of electric power engineering Major Measurable Learning Objectives: • develop models of transformers, motors, and transmission lines from experimental data, • apply models to predict the physical outcome of the experiments, • evaluate the models to demonstrate conditions beyond the limitation of the lab, and • measure real and reactive power in single- and three-phase circuits.</td>
</tr>
<tr>
<td>Virginia Tech</td>
<td>Construction Management</td>
<td>Fundamental elements involved in managing construction projects. Management structure, construction contracts, equipment and labor productivity, scheduling, quality assurance, and cost control Course Objectives: • Enumerate the total construction process from the early conceptual phase through final project review. • Trace the steps needed to prepare the documentation used to call for bids and enter into a construction contract. • Determine the productivity of relatively simple cyclical field operations and understand the techniques that are used to analyze and improve them. • Prepare a construction cost estimate for a relatively simple operation and understand how this estimate is carried forward into the bidding and cost control processes.</td>
</tr>
<tr>
<td>University of Maryland</td>
<td>Engineering Project Management</td>
<td>The principles and techniques of managing engineering and construction projects from the conceptual phase, through design and construction, to completion and close out are presented. Students will develop the analytical skills and awareness necessary on the management side of engineering projects. Topics include project initiation, estimating, budgeting, developing work plans, scheduling, tracking work, design coordination, construction coordination, quality management, managing teams and close out.</td>
</tr>
<tr>
<td>Florid Institute of Technology</td>
<td>Reliability, Availability and Maintainability</td>
<td>To gain an understanding of the Reliability/Maintainability concepts relating to system effectiveness and support system design. Includes basic mathematical concepts, design concepts and data analysis used in quantifying availability, maintainability and reliability as measures of operational readiness and system effectiveness.</td>
</tr>
<tr>
<td>University of Maryland</td>
<td>Reliability</td>
<td>Mathematical models and methods of reliability engineering</td>
</tr>
</tbody>
</table>
Recommendations

The authors have demonstrated that the credit recommendation process for both courses and occupations undergoes a rigorous evaluation process. The challenge facing colleges and universities, engineering colleges and schools and academic departments is to find creative methods to match military credits and or occupational experience to university course credit. The engineering community has typically shunned granting college credit for life experience and the authors do not suggest that here. However, the objective is to suggest creative and appropriate ways to grant credit. For example, college and universities, engineering colleges and schools and academic departments could combine ACE recommendations for both course and occupation and ask the student to take the most current final examination for the course of interest and based on their performance, grant the appropriate course credit.

This path is not unprecedented in the engineering profession. The Fundamentals of Engineering (Engineering in Training) and the Principles and Practice of Engineering exams are accepted methods the profession uses to grant professional engineering licensure. If engineering is willing to administer comprehensive tests to certify an engineer’s knowledge, it seems only reasonable to also consider offering comprehensive tests in selected undergraduate courses to certify a veteran’s knowledge in these areas.

As seen in Figure 6 there are three levels associated with the aircraft electrician position. A description is provided for each level and equivalent credit recommendations are made as well. Skill level three recommends 24 semester hours of credit in the lower-division baccalaureate/associate degree category. The subjects range from AC/DC circuit analysis and electronic devices and circuits to safety and management, with nine credits focusing on electronics type subject matter. Certainly an individual at this level deserves every consideration from the engineering community to equate this experience and training to an academic coursework.

For non-engineering courses universities have used two systems for granting credits the Defense Activity for Non-Traditional Education support, (DANTES) and the College Level Examination Program (CLEP). The DANTES program gives veterans the opportunity to demonstrate college-level achievement through a program of exams in undergraduate college courses. Examinations are available in more than 150 subject areas. By passing these types of exams veterans have earned one-third or more of the credits required for a non-engineering related college degree.

THE CLEP Program allows veterans to earn credit for knowledge they have acquired through independent study, prior course work, on-the-job training, professional development,
cultural pursuits, or internships. Based on successfully passing one or more of 34 CLEP exams veterans will receive credit for undergraduate courses.

Departments of Engineering Education in conjunction with traditional department might consider developing suitable examinations for both the DANTES and CLEP programs to facilitate this process.

Concluding Thoughts

Many colleges and universities use the ACE course recommendations in awarding credit to veterans and active-duty service personnel. These recommendations are widely accepted because of the evaluation process and the commonalities between formal military courses and traditional college/university courses. Both go through a formal evaluation process conducted by qualified experts; they establish learning outcomes for each course and make every effort to document student learning. Why then is the engineering education community slow to accept these credits? An aggressive attempt by our community to match military coursework, training, and occupations could have far a reaching impact on our ability to attract veterans into our programs.

Future Work

The authors of this paper will be meeting with members of the electrical engineering Department heads association to discussion strategies to be more aggressive in the assignment of college/university credit for military coursework, training, and occupations.

References


