

April 23, 2020

TO: The Engineering Faculty

FROM: The Undergraduate Advisory Council

RE: The Certificate in Defense and Security

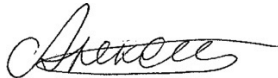
The Faculty of The Undergraduate Advisory Council has approved unanimously the following new undergraduate certificate from the College of Engineering. This action is now submitted to the Engineering Faculty with a recommendation for approval.

Description:

Please see attached for a thorough description of the proposed certificate.

Reason:

The U.S. national security community has identified a need for well-trained graduates with appropriate technical backgrounds and suitably broad perspectives to fill open science and engineering positions. Combined with their Purdue major plans of study, students who attain this certificate will be well-positioned to advance into successful careers working in the US Departments of Energy, Homeland Security, or Defense.

A handwritten signature in cursive script, appearing to read "A. K. ...", positioned above a horizontal line.

Chair of Committee

Undergraduate Certificate in Defense and Security

Originating Center: Purdue Energetics Research Center (Director, Steve Beaudoin)

Sponsoring Program: Office of Professional Practice, College of Engineering

The Certificate in Defense and Security will be open to students in any major who are interested in defense and security.

The U.S. national security community has identified a need for well-trained graduates with appropriate technical backgrounds and suitably broad perspectives to fill open science and engineering positions. To address this need, a suite of courses has been selected to give students broad technical exposure to topics in the areas of secure and strategic computing, propulsion, and advanced materials and materials processing. Students who complete three of these 40000-, 50000- or 60000-level courses, including at least one course from at least two different topic areas, and who also complete ENGR 10301 (1 credit): Introduction to Engineering in Practice in Defense and Security, may receive the Certificate in Defense and Security. Combined with their Purdue major plans of study, students who attain this certificate will be well-positioned to advance into successful careers working in the US Departments of Energy, Homeland Security, or Defense.

Requirements for the Certificate

Completing the Defense and Security certificate requires students to take at least 9 credit hours of courses in at least two out of four technical areas:

- 1) Secure Computing: Information security and cybersecurity
- 2) Strategic Computing: Advanced computational methods with defense applications
- 3) Advanced Materials, Processing and Characterization: Defense-relevant materials and their properties
- 4) Energetics and Propulsion: High energy materials and their uses as propellants (including propulsion systems), explosives and pyrotechnics

Undergraduate research courses (3 credit hours or above) or an approved full-time internship or co-op relevant to Defense and Security may be used in place of one of the courses upon approval from the Office of Professional Practice, College of Engineering. In addition, all students must complete one semester of the seminar course, ENGR 10301 (1 credit): Introduction to Engineering in Practice in Defense and Security. Students may apply no more than 3 credits of transfer credit towards completion of the certificate. Students may substitute approved courses not from the list below, including both 60000-level courses and courses with temporary course numbers, for any requirements listed below. A grade of C- or better is required in all individual courses used to satisfy the certificate requirements, and an average GPA of 2.000 or better is required across all courses used to satisfy the certificate requirements.

Below you will find a table of courses that satisfy the objectives of this program.

Secure Computing
CNIT 41500 - Advanced Coding Security
CNIT 42000 - Basic Cyber Forensics

<u>CNIT 42100 - Small Scale Digital Device Forensics</u>
<u>CNIT 42200 - Cyber Criminology</u>
<u>CNIT 45500 - Network Security</u>
<u>CNIT 45600 - Wireless Security And Management</u>
<u>CNIT 47100 - Vulnerability Analysis And Testing</u>
<u>CNIT 51200 - Managing Resources And Applications For Homeland Security</u>
<u>CNIT 55500 - Advanced Network Security</u>
<u>CNIT 56500 - Information Security Management</u>
<u>CS 42600 - Computer Security</u>
<u>CS 50010 - Foundational Principles Of Information Security</u>
<u>CS 50011 - Introduction To Systems For Information Security</u>
<u>CS 52600 - Information Security</u>
<u>CS 52700 - Software Security</u>
<u>CS 52800 - Network Security</u>
<u>CS 52900 - Security Analytics</u>
<u>CS 55500 - Cryptography</u>
<u>ECE 40400 - Introduction to Computer Security</u>
<u>ECET 53600 - Embedded Systems Security</u>

Strategic Computing
<u>CS 47100 – Introduction to Artificial Intelligence</u>
<u>CS 50500 - Distributed Systems</u>
<u>ECE 45300 – Fundamentals of Nanoelectronics</u>
<u>ECE 47300 – Introduction to Artificial Intelligence</u>
<u>ECE 57700 - Engineering Aspects Of Remote Sensing</u>
<u>ECON 45100 Game Theory OR ECON 51000 - Game Theory</u>
<u>PHYS 52600 - Physics Of Quantum Computing And Quantum Information</u>

Energetics and Propulsion
<u>AAE 43800 - Air-Breathing Propulsion</u>
<u>AAE 43900 - Rocket propulsion</u>
<u>AAE 51800 - Low-Gravity Fluid Dynamics</u>
<u>AAE 51900 – Hypersonic Aerothermodynamics</u>
<u>AAE 53500 - Propulsion Design, Build, Test</u>
<u>AAE 53700 - Hypersonic Propulsion</u>
<u>AAE 53800 - Air Breathing Propulsion</u>
<u>AAE 53900 - Advanced Rocket Propulsion</u>

ECE 42300 - Electromechanical Motion Control
ECE 43200 - Elements Of Power System Engineering
ME 43400 - Gas Turbines For Power And Propulsion
ME 52500 - Combustion

Advanced Materials, Processing and Characterization
AAE 55500 - Mechanics Of Composite Materials
AAE 55900 - The Mechanics Of Friction And Wear
CHM 54800 - Radiochemistry
ECE 55200 - Introduction To Lasers
ECE 55700 - Integrated Circuit Fabrication Laboratory
ME 41300 - Noise Control
ME 43000 - Power Engineering
ME 47500 - Automatic Control Systems
ME 48900 - Introduction To Finite Element Analysis
ME 50100 - Statistical Thermodynamics
ME 57100 - Reliability Based Design
MSE 51000 - Microstructural Characterization Techniques
MSE 51200 - Powder Processing
MSE 55600 - Fracture Of Materials
MSE 57600 - Corrosion
NUCL 42001 - Radiation Interaction With Materials And Applications
NUCL 46000 - Introduction To Controlled Thermonuclear Fusion
NUCL 52000 - Radiation Effects and Reactor Materials
NUCL 55300 - Nano-Macro Scale Applications Of Nuclear Technology
NUCL 56000 - Introduction To Fusion Technology
NUCL 56300 - Direct Energy Conversion