UNIVERSITY OF WASHINGTON

CREATING AND CHANGING UNDERGRADUATE ACADEMIC PROGRAMS

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College/Campus Engineering / Seattle	**Department/Unit** Aeronautics & Astronautics	**Date** March 1, 2011

New Programs

- ☒ Leading to a Bachelor of Science in Aerospace Engineering degree.
- ☐ Leading to a Bachelor of _____degree with a major in _____.
- ☐ Leading to a _____ Option within the existing major in _____.
- ☐ Leading to a minor in _____

Changes to Existing Programs

- ☐ New Admission Requirements for the Major in _____ within the Bachelor of _____.
- ☐ Revised Admission Requirements for the Major in _____ within the Bachelor of _____.
- ☐ Revised Program Requirements for the Major in _____ within the Bachelor of _____.
- ☐ Revised Requirements for the Option in _____within the major in _____.
- ☐ Revised Requirements for the Minor in _____.

Other Changes

- ☐ Change name of program from _____ to _____.
- ☐ New or Revised Continuation Policy for _____.
- ☐ Eliminate program in _____.

Proposed Effective Date: **Quarter:** ☒ Autumn ☐ Winter ☐ Spring ☐ Summer **Year: 20 13**

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EXPLANATION OF AND RATIONALE FOR PROPOSED CHANGE

For new program, please include any relevant supporting documentation such as student learning outcomes, projected enrollments, letters of support and departmental handouts. (*Use additional pages if necessary*).

A new degree program in Aerospace Engineering, leading to a Bachelor of Science in Aerospace Engineering (BSAE), is proposed to be offered in the United Arab Emirates (UAE) at the United Arab Emirates University (UAEU) in Al Ain. This program will be offered by the UW Department of Aeronautics and Astronautics (A&A) in Seattle, which will oversee and develop the new degree program.

The program will be similar to the existing Bachelor of Science in Aeronautical and Astronautical Engineering (BSAAE) currently offered by the UW A&A Department, with minor adjustments in course offerings and schedules. It will be an upper-division, degree-completion program, operating during the junior and senior years, and will be offered on a quarter schedule, per WAC Section 478-132-030.

Because the students in this degree program will be located in the UAE at all times, we are also seeking a waiver of the 45-credit residency requirement at the UW in Seattle.

Please see the attached Appendices A-G for details about the proposed degree program.

OTHER DEPARTMENTS AFFECTED

List all departments/units/ or co-accredited programs affected by your new program or changes to your existing program and acquire the signature of the chair/director of each department/unit listed. Attach additional page(s) if necessary. *See online instructions.

Department/Unit:	Chair/Program Director:	Date:
Department/Unit:	Chair/Program Director	Date:

CATALOG COPY

Catalog Copy as currently written. Include only sections/paragraphs that would be changed if your request is approved. Please cross out or otherwise highlight any deletions.

N/A (a complete new program is proposed)

PROPOSED CATALOG COPY

Reflecting requested changes (Include exact wording as you wish it to be shown in the printed catalog. Please underline or otherwise highlight any additions. If needed, attach a separate, expanded version of the changes that might appear in department publications). **Please note:** all copy will be edited to reflect uniform style in the General Catalog.

NOTE: The proposed Catalog Copy is almost identical to the one currently in use by the department. Only minor changes have been made to reflect that the source of the transfer students will be the UAEU. These students' applications will be treated like those of transfer students from other universities, and thus will have to meet similar criteria.

The proposed Catalog Copy is provided in Appendix B.

APPROVALS

Chair/Program Director:	Date: . 3/1/2011
College/School/Campus Curriculum Committee:	Date:
Dean/Vice Chancellor:	Date:
Faculty Council on Academic Standards/ General Faculty Organization/Faculty Assembly Chair:	Date:

POST TRI-CAMPUS APPROVAL (when needed)

Faculty Council on Academic Standards/ General Faculty Organization/Faculty Assembly Chair:	Date:

Appendix A

Proposed UW Bachelor's Degree Program in Aerospace Engineering at United Arab Emirates University (UAEU)

- **Overview**

The proposed new degree program in Aerospace Engineering, i.e., Bachelor of Science in Aerospace Engineering (BSAE), will be offered in the United Arab Emirates (UAE) at the United Arab Emirates University (UAEU) in Al Ain, in the emirate of Abu Dhabi. This program will be offered by the UW Department of Aeronautics and Astronautics (A&A) in Seattle, which will oversee and develop the new degree program.

The program will be similar to the existing Bachelor of Science in Aeronautical and Astronautical Engineering (BSAAE) currently offered by the UW A&A Department, with minor adjustments in course offerings and schedules. It will be an upper-division, degree-completion program, operating during the junior and senior years. It is anticipated that approximately 30 students initially will enroll in the program; and the number of enrollees is expected to eventually increase to approximately 70 students per year. Because these students will be entirely in residence at the UAEU in Al Ain, United Arab Emirates for the duration of the program, ***a waiver to the 45-credit residency requirement is requested.***

The new degree program will be similar to the existing UW BSAAE degree in scope, quality, requirements, and content. However, it will not emphasize astronautics but will focus primarily on aeronautics. There will be very few space-oriented classes and no space systems design class, as compared to the current BSAAE degree program in Seattle. In addition, some minor adjustments in course schedules and compulsory courses will be implemented, to suit the aeronautics emphasis.

This new degree is directly related to the mission of the department and will further the goals of A&A. It will internationalize the curriculum and the student population, and allow faculty to understand pedagogy in another part of the world. In addition, the design and delivery of this degree forms part of a larger effort of education and research in aerospace engineering within Abu Dhabi. This combined effort will allow the department to prosper and grow during the current budgetary crisis in the State of Washington.

This degree program will be offered by the UW at Abu Dhabi for a limited number of years, from the 2013-2014 academic year through the 2019-2020 academic year (2013 will be when the UW degree program at UAEU will begin accepting students as juniors). Starting in the 2021-2022 academic year, an Aerospace Engineering degree program will be offered by the UAEU, and the UW will cease to offer an undergraduate degree program in Abu Dhabi.

The UW undergraduate program in Aerospace Engineering will be overseen by UW program directors in Abu Dhabi and Seattle, who will be assisted by support staff, an advisor in Abu Dhabi and a student services specialist in Abu Dhabi. The program budget will also fund selected FTE in Seattle, including an admissions specialist, as well as academic support staff and budgetary and marketing staff. All academic aspects of the program will be overseen by the Seattle-based A&A faculty as a whole.

The UAEU has agreed to offer the UW access at no cost to all of its facilities and infrastructure, including classrooms, classroom assignments, labs, office space, IT infrastructure, housing, and libraries.

The UW will abide by all of the current policies and procedures contained in the UW Handbook and the Student Conduct Code, including the policies dealing with academic misconduct. It also will honor all federal regulations such as FERPA and the ADA.

This new degree will be offered on a quarter basis (per WAC Section 478-132-030) as a fee-based program with no funding from the State of Washington.

- **Admission requirements and admission processes to be used, including admission to UW and English language proficiency testing**

  The admissions requirements will be identical to students seeking admission to the UW BSAAE program in Seattle. Students shall apply for admission to the program during their sophomore year of study at the UAEU. All UAEU students take the TOEFL as a condition for admission prior to their freshman year. Given that the proposed UW-degree program at the UAEU does not begin until the junior year, and that all instruction at the UAEU is in English, no significant language issues are anticipated. Nonetheless, applicants to the UW degree program shall be required to take the TOEFL or IELTS test prior to admission into the program in their junior year, and shall be expected to achieve the required scores as international applicants to the UW undergraduate program in Seattle.*

- **Description of the curriculum, including general education requirements, and graduation requirements**

  Please see Appendices C, D, and E. Appendix C shows a Sample Schedule for all four years of a student's program, including the number of credits and semester-to-quarter credit conversions. All the equivalent prerequisite courses available at UAEU and the Aerospace Engineering major courses to be offered by UW at UAEU are listed and described in Appendix D. Appendix E provides the Aerospace Graduation Requirements, which are similar to those currently in use in the A&A department in Seattle.

  The prerequisite courses listed for the first two years, which the students will complete as UAEU students, will be offered on a semester basis, and were selected as equivalents to prerequisites currently available at the UW in Seattle. The Aerospace Engineering major courses, which will be offered on the quarter system, will be identical to the A&A courses offered at the UW in Seattle and they will carry the same AA prefix as at the UW in Seattle. One or two new courses, to be worked out later with UAEU, may be offered only at UAEU, with the approval of the UW A&A Department.

* The required TOEFL scores for those wishing to be exempt from taking English as a Second Language, or other English proficiency courses, are higher than for regular admission to the UW because there is no room in the junior year schedule for remedial English courses. A minimum TOEFL score of 92 or IELTS score of 7 is required.

- **Departmental honors**

  The students in the UW program at UAEU will not initially be eligible for departmental honors due to the lack of active research at UAEU that is discipline-related. In order to meet the requirements for departmental honors a student must participate in a minimum of 3 credits of undergraduate research. Because UAEU does not yet have any research activities in this discipline, the departmental honors options will not be available until the program has established sufficient research activities in which the UW students at UAEU can actively participate.

- **Continuation policy**

  Having similar academic requirements and a similar plan of study to the UW-Seattle BSAAE program, the new UW Aerospace Engineering degree at the UAEU will have the same continuation policy as the Seattle program. That policy is provided in Appendix F.

- **Academic misconduct**

  The Academic Misconduct Policy will be the same as used by the College of Engineering and the A&A department in Seattle (see Appendix G).

- **Non-discrimination policy**

  The UW non-discrimination policy, which Prohibits discrimination or harassment against a member of the University community because of race, color, creed, religion, national origin, citizenship, sex, age, marital status, sexual orientation, disability, or military status, shall apply to this program.

- **Potential for admitted students attending classes on campus in Seattle, Tacoma, or Bothell**

  None of the students in this program will be able to attend classes on campus in Seattle, Tacoma, or Bothell. The students involved will be entirely in residence at the UAEU in Al Ain, United Arab Emirates, for the duration of their program, and will be coded as such. ***Accordingly, a waiver to the 45-credit residency requirement will need to be granted to these students.***

- **Methods of course delivery to be used and number of courses to be taught by UW faculty**

  Courses will be delivered on-site at the UAUE Campus in Al Ain, UAE. Courses will be primarily taught by faculty who have permanent status at the UW and appropriate adjunct faculty appointments through the Department of Aeronautics and Astronautics in Seattle. Before teaching in the program, these faculty will spend one to two quarters at the UW in Seattle working with UW A&A faculty mentors on the curriculum and research projects. Necessary faculty for the new degree program will be jointly recruited, interviewed, and

selected by a joint committee of UW and UAEU faculty. UW Seattle-based A&A faculty will teach selected courses (1-2 per year) at the UAEU in Al Ain.

The total number of courses taught in this new program by UW faculty (whether UAEU- or Seattle-based) is 24. Additional courses may be added in the future, as needed.

- **Program faculty and methods of approval if not UW faculty**
  See above.

- **Program goals and learning objectives**

The goals and learning objectives of the new program will be similar to those for the existing BSAAE degree program in Seattle, specifically:

1) Objective number one is to solve critical technical problems related to aeronautical engineering.
2) Objective number two is to devise innovative ways to develop and apply new technologies.
3) Objective number three is to contribute knowledge to and participate in the identification and solution of problems facing society.
4) Objective number four is to engage in lifelong continuous learning and professional contribution.

- **Program outcome measures (Same as current A&A ABET Outcomes)**

The program outcome measures of the new program will be similar to those for the existing BSAA degree program in Seattle. Multiple means will be employed to determine how well students have accomplished what they are expected to know and be able to do by the time they graduate from the program. The evaluation instruments will include examinations and projects, student surveys and interviews, and oversight evaluations performed by the UW A&A Faculty in Seattle. The desired specific outcomes include:

a) An ability to apply knowledge of mathematics, science and aerospace engineering (fluids, structures, controls, propulsion, flight mechanics, orbital mechanics, and energetics)

b) An ability to design and conduct experiments, as well as to analyze and interpret data

c) An ability to design a system, component or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability and sustainability

d) An ability to function on multi-disciplinary teams

e) An ability to identify, formulate and solve engineering problems

f) An understanding of professional and ethical responsibilities

g) An ability to communicate effectively

h) The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental and societal context

i) A recognition of the need for, and an ability to engage in life-long learning

j) Knowledge of contemporary issues

k) An ability to use the techniques, skills and modern engineering tools necessary for engineering practice

- **Program quality oversight process**

The new program will be subject to extensive oversight from the UW A&A Department in Seattle. An A&A faculty member in Seattle will serve as Director of this program, with assistance from an administrator dedicated to the support of the UAEU/UW collaboration, as well as an undergraduate academic advisor who shall be hired specifically to support this program. All of these support positions will be in Seattle. In addition, the UW shall hire a full-time program director that shall be in residence at the UAEU.

All UAEU faculty involved with this program shall first spend one or more quarters in residence in the UW A&A Department in Seattle. This will ensure that they are intimately familiar with the A&A program in Seattle, upon which the new program at the UAEU is based, and will also ensure that all individuals are capable instructors and fully qualified to teach aerospace engineering courses at the UAEU. All satisfactory visiting UAEU faculty members will be granted affiliate appointments as members of the A&A Faculty.

In addition , UW-Seattle A&A faculty will regularly visit the UAEU during each academic year to directly observe and monitor the status and quality of the new undergraduate program in Abu Dhabi. Such oversight will include 1-2 quarter-long visits by UW-Seattle A&A faculty each academic year of the program. Because the proposed program will be a joint venture with UWEO, the course instructors will be evaluated via a process similar to the on-line evaluation system that UWEO currently uses for graduate courses.

An expressed goal of the program is to eventually achieve ABET accreditation for the UAEU Aerospace Engineering program (however, this accreditation will not be sought for the UW degree program at the UAEU). Taking the necessary steps to gain ABET accreditation will further ensure the quality of the new aerospace undergraduate degree at the UAEU. Achieving ABET accreditation for the UAEU aerospace engineering program will be the ultimate responsibility of the UAEU.

Finally, the entire UW A&A program at UAEU will be reviewed within 6 years of its approval, independent of when it starts instruction.

- **Method of providing library and advising services to students**

The UAEU has a well-equipped academic library fully satisfactory to support the students in the proposed program. Onsite academic advising will be provided by a dedicated UW undergraduate advisor in Abu Dhabi, as well as the UW-trained UAEU faculty. Furthermore, students admitted to the UW program at UAEU will have access to online UW

resources (such as Libraries, e-mail, etc.) and will be issued UW Net IDs, just like UW students in Seattle.

Appendix B

Proposed Catalog Listing

Upper Division Admission

1. Course requirements: MATH 124, MATH 125, MATH 126, MATH 307, MATH 308, PHYS 121, PHYS 122, CHEM 142, AA 210, CEE 220, ME 230, MSE 170, AA 260, HCDE 231 and 5 credits of English Composition. Equivalent courses approved by the UW may be substituted.
2. Grade requirements: At least 75 credits must be completed, with a minimum overall GPA of 2.5 and a minimum grade of 2.0 in each course required to be considered for admission. Completion of minimum requirements does not guarantee admission.

Graduation Requirements

180 credits as follows**:**

1. **General Education Requirements (85 credits)**
    a. **Areas if Knowledge:** 49 credits as follows:
        - **Visual, Literary, and Performing Arts** (VLPA) and **Individuals & Societies** (I & S): 24 credits to include:
          A minimum of 10 credits in VLPA and a minimum of 10 credits of **I & S** plus 4 additional credits in either area.
        - **Natural World**: 25 credits to include:
          CHEM 142 (5 credits)
          PHYS 121, PHYS 122 (10 credits)
          An additional 10 credits of natural-world courses are required.
          (Consult department for a list of approved courses.)

    b. **Mathematics:** 21 credits to include**:** MATH 124, MATH 125, MATH 126, MATH 307, MATH 308

    c. **Written and Oral Communications**: 12 Credits to include: one 5-credit English composition course from the University list, HCDE 231 Introduction to Technical Writing, and HCDE 333 Advanced Technical Writing & Oral Presentation, or departmentally approved alternatives.

2. **Major Requirements** (94 credits)
    a. **Engineering Fundamentals**: 20 credits to include: AA 210, CEE 220, ME 230, MSE 170 and AA 260.

b. **Major Requirements:** 74 credits to include:

1. Junior year core courses (44 credits): AA 301, AA 302, AA 310, AA 311, AA 312, AA 320, AA 321, AA 322, AA 432, AA 331, AA 332, AA 360.

2. Senior year core courses (15 credits): AA 410-411, AA 430, AA 447.

3. Senior technical electives (15 credits)
With approval, 3 credits of the latter may be chosen from another area of engineering.

c. **Electives:** 4 credits of free electives, which may be used to meet the 180 credits required for graduation.

Appendix C
Department of Aerospace Engineering Sample 4-Year Schedule

Year 1: ***Autumn Semester*** ***Spring Semester***

MATH 1110	**Calculus I for Engr.**	**3 = 4.5**	**MATH 1120**	**Calculus II for Engr.**	**3 = 4.5**
CHM 1701	**Gen. Chem & Lab**	**4 = 5 + 1**	**GENG 315**	**Engr. Pract. & Entrepr.**	**3 = 4.5**
PHYS 1110	**Physics for Engineers**	**4 = 5 + 1**	**PHYS 1120**	**Physics for Engineers**	**4 = 5 + 1**
ESPU 107	***English for Engr.***	***3 = 0***	**ENGL 131**	**Distance Learn. Comp**	**(5)**
GENG 200	**Intro. Programming**	**2 = 3**	**GENG 250**	**Freshman Lab**	**2 = 3**
A O K- I & S	**GENG 215 Ethics**	**2 = 3**	**STATS 220**	**Engr. Statistics**	**2 = 3**
TOTALS – Semester and Quarter *18* (-3) = ***15*** = 20.5 + 2			**TOTALS - Semester and Quarter**		***14*** = 20 + 5 + 1

Year 2 ***Autumn Semester*** ***Spring Semester***

MATH 2210	**Differential Eqn.**	**3 = 3 + 1.5**	**MATH 2220**	**Matrix Algebra**	**3 = 3 +1.5**
GENG 220	**Thermodynamics**	**3 = 4 + .5**	**MECH 310**	**Dynamics & Vibrations**	**3 = 4 + .5**
GENG 240	**Statics**	**3 = 4 + .5**	**GENG 305**	**Mechanics of Materials**	**3 = 4 + .5**
MECH 390	**Engr. Materials**	**3 = 4 + .5**	**ENGL 370**	**Tech. & Prof. Writing**	**3 = 3 + 1.5**
PHYS 235	**Waves and Optics**	**3 = 4.5**	**A O K – VLPA**	**? ISLAM 1103[§]**	**3 = 4.5 or 0**
A O K - I & S	**? HSS 105[§]**	**3 = 4.5 or 0**	**A O K - VLPA**	**e.g., LNG 210**	**3 + 4.5**
TOTALS – Semester and Quarter *l8* (-3) = **15** = 24 or 19.5 + 3			**TOTALS –Semester and Quarter** *18 (*–3) = **15** = 23 or 18.5 = 4		

59 or 65 Semester Credits[§] = 88.5 or 97.5 Quarter Credits + 5 Quarter DL Credits
Total Quarter Credits = 93.5 or 102.5

Comprised of 81.5 LD or 90.5 LD Qtr credits and 12 UD Qtr credits
Total LD and UD Quarter Credits 93.5 or 102.5

[§] *Depending on transferability of courses. 90 Lower Division credits can apply towards degree without petition. MATH 2210, MATH 2220, STATS 220 may transfer as Upper Division Credits this gives 12 total UD credits.*

Year 3: ***Autumn Quarter*** ***Winter Quarter*** ***Spring Quarter***

AA 310 Orbital Mechanics	4	**AA 301 Compressible Aerodynamics**	4	**AA 302 Incompressible Aerodynamics**	4
AA 311 Atmos. Flight Mech.	4	**AA 312 Structural Vibrations**	4	**AA 322 Aerospace Lab II**	3
AA 320 Aerospace Instrument.	3	**AA 321 Aerospace Lab I**	3	**AA 360 Propulsion**	4
AA 331 Aerospace Structures I	4	**AA 332 Aerospace Structures II**	4	**AA 432 Composite Materials**	3
QUARTER TOTAL	**15**	**QUARTER TOTAL**	**15**	**QUARTER TOTAL**	**14**

Year 4: ***Autumn Quarter*** ***Winter Quarter*** ***Spring Quarter***

AA 447 Control Aerospace Sys	4	**AA 410 Aircraft Design I**	4	**AA 411 Aircraft Design II**	4
AA 430 Finite Element Analysis	**3**	Technical Elective	3	Technical Elective (AA 419, 461, 480)	3
Technical Elective (AA 402, 470)	3-4	(AA 400, 440, 448)		Technical Elective	3
A O K – VLPA - DL	5	Technical Elective	3	*Free Elective or VLPA - DL*	*5*
		A O K - I & S - DL	5		
QUARTER TOTAL	**15-16**	**QUARTER TOTAL**	**15**	**QUARTER TOTAL**	**15**

Technical Electives - You must choose 5 courses or a minimum of 15 credits of technical electives prior to graduation. One course may be taken outside the department. It is suggested to take one technical elective in the Autumn and two each in Winter and Spring quarters.

AA 400 Gas Dynamics	(3)	AA 402 Fluid Mechanics*	(3)
AA 419 Aerospace Heat Transfer	(3)	AA 440 Flight Mechanics	(3)
AA 448 Control Syst. Sensors & Actuators	(3)	AA 461 Advanced Propulsion	(3)
AA 470 Systems Engineering	(3)	AA 480 System Dynamics	(3)

Note: It is not possible for students to meet all VLPA and I & S requirements during their first two years. Accordingly, they will have to take VLPA and I & S courses during their junior year and/or senior year. The sample schedule above shows them taking such courses during their senior because the junior year is filled with AA courses. Since the students will be on location at the UAEU, they will have only two options for fulfilling the VLPA and I & S requirements. One is by combining UAEU semester system courses with the quarter systems courses, which could prove to be difficult, or by taking the remaining VLPA and I & S courses by Distance Learning (DL) through the UWEO (the option shown in the chart above). As per normal UW policy, the DL-designated courses will be treated as transfer courses and transfer credits. DL-designated courses are not considered in-residence credits, even though they are administered by the UW.

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* AA 402 may be replaced by a new course, AA 425 (number tentative), CAD and Manufacturing, to be offered in the UW program at UAEU only. Discussions on this issue, and on another possible course addition in the senior year have been initiated by UAEU. If the A&A Department approves these changes, normal UW course approval procedures will be followed.

Appendix D

Course Descriptions

Prerequisites

These courses are offered by UAEU on a semester schedule, and are required for admission to the new UW Aerospace Engineering Program offered at UAEU. They are similar to the prerequisites required for admission to the UW A&A program in Seattle.

Note: SCH = Semester Credit Hours

Mathematics

MATH 1110 Calculus I for Engineers (3 SCH)

Differential Calculus of functions of one variable: Functions of one variable. Techniques of Differentiation. Derivatives of Trigonometric, Exponential & Logarithmic Functions - Chain Rule - Implicit Differentiation. Maximum & Minimum Values. Increasing, Decreasing & Concave Functions. Inverse Trigonometric Functions. Hyperbolic Functions. Some Engineering Applications.

Integral Calculus of functions of one variable: Definite and Indefinite Integrals. Techniques of Integration: Integration by Substitution - Integration by Trigonometric Substitutions - Integration by Parts - Integration by Partial Fractions. Applications of Definite Integrals in Geometry. Some Engineering Applications. Functions of Two variables

Students are obliged to attend an extra 1 hr of Math problem solving managed by CRU. *Prerequisite: MATU 1332, ENGU 1303*

MATH 1120 Calculus II for Engineers (3 SCH)

Differential Calculus of functions of several variables. Vector Valued Functions - Functions of Several Variables- Partial Derivatives -Chain Rule -Gradient and Directional Derivatives – Extrema of Functions of Several Variables. Quadratic Surfaces. Vector Fields and Line Integrals - Double Integrals in Cartesian and Polar Coordinates - Triple Integrals in Cartesian, Cylindrical and Spherical Coordinates.

Students are obliged to attend an extra 1 hr of Math problem solving managed by CRU. Prerequisite: MATH 1110

MATH 2210 Differential Equations and Engineering Applications (3 SCH)

Ordinary Differential Equations First Order Differential Equations: Separable- Homogenous -Linear- Bernoulli - Exact- Integrating Factors. Second Order Linear Differential Equations: Homogenous Equations with Constant Coefficients - Undetermined Coefficients Method - Variation of Parameters Method - Euler's Equation - Non Homogenous Equations - Higher Order Linear Equations - Systems of Differential Equations. Laplace Transforms Basic Properties - Solving Initial Value Problems Using Laplace- Solving Integral Equations - Solving Systems of Differential Equations. Some Engineering Applications. Prerequisite: MATH 1120

MATH 2220 Linear Algebra and Engineering Applications (3 SCH)

Linear Algebra. Matrices. Determinants- System of Linear Equations- Eigenvalues and Eigenvectors- Diagonalization. Some Engineering Applications. Complex Analysis Complex Numbers - Complex Variables - Differentiation of Complex Functions - Complex Integration - Conformal Mappings. Prerequisite: MATH 1120

Science

PHYS 1110 Physics and Engineering Applications I (4 SCH)
The course aims at developing a clear understanding of the basic physics concepts in mechanics for the Engineering students. It includes: units and dimensions of physical quantities, vectors, kinematics, Newton's laws of motion, work and energy, linear momentum and collision, angular momentum, rotational motion about an axis and its engineering applications. The course intends to develop the students' learning skills (e.g. problem solving) and creative thought needed to meet the challenges in the modern technology by using Laptop as educational tool. The course includes laboratory sessions with emphasis on engineering application. Prerequisite: MATU 1332, ENGU 1303

PHYS 1120 Physics and Engineering Applications II (4 SCH)
The course aims at developing a clear understanding of the basic physics concepts in electricity and magnetism. Topics covered include: Coulomb's Law, the electrostatic field, the electrostatic potential, capacitance and dielectrics, magnetic field and magnetic forces, sources of magnetic fields, electromagnetic induction, AC circuits, engineering applications in electricity and magnetism. The course seeks to develop students' learning skills (e.g. problem solving and report writing) and creative thought needed to meet the challenges in the modern technology by using Laptop as educational tool. The course includes laboratory sessions with emphasis on engineering application. Prerequisite: PHYS 1110

PHYS 235 Waves and Optics (3 SCH)
This course aims at developing clear understanding of basic concepts of waves and optics. It includes: oscillatory motion, wave motion, sound waves, superposition and standing waves, electromagnetic waves, the nature of light, laws of geometric optics, image formation by lenses and mirrors, some optical instruments, interference, diffraction and polarization of light. ***Prerequisite: PHYS 105***

CHEM 1701 Chemistry and Engineering Applications I (4 SCH)
Measurements; chemical formulas and equations; stoichiometry; reactions in aqueous solutions; physical behavior of gases; electronic structure of the atom: the periodic table and the periodic properties; chemical bonding, molecular structure, thermo-chemistry, liquids, solutions, and solids; Engineering applications covering the previous subjects.
Prerequisite: MATU 1332, ENGU 1303

Engineering Fundamentals

GENG 215 Introduction to Engineering Design and Ethics (2 SCH) ***[Eligible for INS credits]***
This course introduces students to engineering ethics, as set of moral principles that relate to engineering projects and designs. The course explores creative ways of reconciling moral claims. It outlines the responsibilities of engineers towards public safety and the environment within economic constraints and governing laws. A systematic engineering design process is introduced. Each design stage explores relevant methods and their ethical implications. The course critically examines litigations that involve the engineering profession in relation to product liability.

STAT 220 Engineering Statistics (2 SCH)
Concepts of probability theory and statistical applications in engineering systems. The course covers engineering applications of probability theory, sampling theory, random samples, random variables, probability models, basic statistics, confidence intervals, hypothesis testing, inference, simple linear regression. *Prerequisite: MATH 1110*

GENG 200 Introduction to Programming (2 SCH)

Excel, simple and nested conditional statements, trend line graphing and equation solving, fundamentals of programming, logic, algorithms, decision making, programming concepts, variable types, loops, arrays, visual basic programming environment, VB procedures, VB functions, VB macros, debugging of programs, exchanging data between excel and VB functions and macros, writing user defined functions, invocation of the VB functions, macros and procedures from the Excel environment. *Prerequisite: , ENGU 1303, INTU 1302*

GENG 250 Freshman Lab (2 SCH)
This course is an introduction to techniques for engineering measurement, data acquisition, processing, and analysis. Laboratory exercises are drawn from various engineering disciplines. *The delivery pattern is based on a series of mini lectures on laboratory safety, laboratory practice and hardware, experimental data processing, report writing, presentations and a project based hands-on approach to laboratory experimentation. Co-requisite : STAT 220*

GENG 220 Engineering Thermodynamics (3 SCH)
Thermo-physical properties of pure substances and gases. 1st law of thermodynamics, conservation of energy, and closed and open systems. Limitations and efficiencies of energy conversion processes. Introduction to the 2nd law of thermodynamics and entropy. Applications in Engineering. *Prerequisite: PHYS 1110*

MECH 390 Engineering Materials (3 SCH)
This course aims at studying basic concepts and fundamentals of material science and engineering. Topics covered include atomic structure, arrangements, unit cells, types of engineering materials, testing, mechanical and electrical properties, processing, and behavior in service, corrosion, deformation, material and process selection. Prerequisite: CHEM 1701

GENG 315 Engineering Practice and Entrepreneurship (3 SCH) [Is this eligible for VLPI-INS credits??]
Introduction to the basic concepts and principles of engineering practice and entrepreneurship. Familiarization of the different cost components, cost estimation techniques, cash flow analysis, and measures of project performance. Introduction to risk analysis. Comparing alternatives and replacement analysis. Application of engineering practice and entrepreneurship to engineering design and projects. *Prerequisite: MATH 1110*

GENG 240 Statics (3 SCH)
Scalar and vector quantities, Two dimensional force systems: forces, moments, Couples and resultants, free-body diagrams, equilibrium conditions, three-dimensional force systems, analysis of structures: method of joints, method of sections, distributed forces: introduction to shear forces and bending moments in beams, Center of mass and centroid, Properties of areas, and friction.

GENG 305 Mechanics of Materials (3 SCH)
This course aims at introducing basic concepts and applications of elastic stress analysis. Topics covered include stress and strain; material behavior; Hooke's law; axial loading; safety factors; properties of area; shear force and bending moment diagrams; bending stresses and defections; shear stresses in beams; torsion of circular members; combined stresses; Mohr's circle; buckling of columns; and engineering applications. *Pre-requisite: GENG 240*

MECH 310 Dynamics and Vibrations (3 SCH)
This course intends at providing fundamentals of particles and rigid body dynamics. The course starts with dynamics of particles in plane, rectilinear and curvilinear motion, work done, Kinetic energy, potential energy, particle impulse and momentum. It also includes vibration and time response, kinematics of rigid bodies, angular and absolute motion, dynamics of steady and variable mass flow, plane kinematics and kinetics of rigid bodies. *Pre-requisite: PHYS 1110, MATH 1110 Prerequisite: PHYS 1120, GENG 250*

UW Aerospace Engineering Program at UAEU (Junior and Senior Years)

These courses will be offered on a quarter schedule (per WAC Section 478-132-030) as part of the UW Aerospace Engineering Program.

The course prefix AA will be used in the program at UAEU, just as it is used in the A&A program in Seattle. The course descriptions are identical to the similarly-numbered courses offered in the UW A&A program in Seattle. However, the name of the Bachelor's degree will be different, as stated at the beginning of Appendix A. In this manner, graduates of the UW program at UAEU will be distinguished from graduates of the UW in Seattle.

Note: QCH = Quarter Credit Hours

AA 301 Compressible Aerodynamics (4 QCH) Aerodynamics as applied to the problems of performance of flight vehicles in the atmosphere. Kinematics and dynamics of flow fields. Thin airfoil theory; finite wing theory. Compressible fluids; one-dimensional compressible flow; two-dimensional supersonic flow. Prerequisite: GENG 220 or equivalent. Offered W

AA 302 Incompressible Aerodynamics (4 QCH) Aerodynamics as applied to the problems of performance of flight vehicles in the atmosphere. Kinematics and dynamics of flow fields; incompressible flow about bodies. Thin airfoil theory; finite wing theory. Prerequisite: PHYS 235; MATH 2210. Offered: Sp.

AA 310 Orbital and Space Flight Mechanics (4 QCH) Newton' s law of gravitation. Two-body problem, central force motion, Kepler' s laws. Trajectories and conic sections. Position and velocity as functions of time. Orbit determination and coordinate transformations. Rocket dynamics, orbital maneuvers, Hohmann transfer. Interplanetary trajectories, patched conics. Planetary escape and capture. Gravity assist maneuvers. Prerequisite: MECH 310. Offered: A.

AA 311 Atmospheric Flight Mechanics (4 QCH) Applied Aerodynamics, aircraft flight "envelope," minimum and maximum speeds, climb and glide performance. Range and endurance, take-off and landing performance, using both jet and propeller power plants. Longitudinal and dynamic stability and control, wing downwash, stabilizer and elevator effectiveness, power effects. Lateral and directional stability and control. Offered: A.

AA 312 Structural Vibrations (4 QCH) Vibration theory. Characteristics of single and multidegree-of-freedom linear systems with forced inputs. Approximate methods for determining principal frequencies and mode shapes. Application to simple aeroelastic problems. Prerequisite: MECH 310. Offered: W.

AA 320 Aerospace Instrumentation (3 QCH) Hands-on laboratory experience in aerospace instrumentation. Students build sensors, power supplies, and circuits. Application of signal conditioning to wind tunnel data. Digital systems, A/D conversion, D/A conversion, and actuator control. Introduction to instrumentation requirements for space vehicles. Offered: A.

AA 321 Aerospace Laboratory I (3 QCH) The design and conduct of experimental inquiry in the field of aeronautics and astronautics. Laboratory experiments on supersonic flow, structures, vibrations, material properties, and other topics. Theory, calibration, and use of instruments, measurement techniques, analysis of data, report writing. Offered: W.

AA 322 Aerospace Laboratory II (3 QCH) The design and conduct of experimental inquiry in the field of aeronautics and astronautics. Laboratory experiments on subsonic aerodynamics, supersonic flow, structures,

propulsion, and other topics. Theory, calibration, and use of instruments, measurement techniques, analysis of data, report writing. Offered: Sp.

AA 331 Aerospace Structures I (4 QCH) Analysis and design of aerospace structures. Review of concepts of stress, deformation, strain, displacement and equations of elasticity. Applications to aerospace structural elements including general bending and torsion of rods and beams, and open and closed thin-walled structures and box beams. Prerequisite: GENG 305. Offered: A.

AA 332 Aerospace Structures II (4 QCH) Bending of plates and shells. Buckling analysis. Energy principles and minimum potential energy. Introduction to the finite element method. Airworthiness and airframe loads. Strength and damage characteristics of ductile, brittle and composite materials. Elements of fracture mechanics and fatigue. Prerequisite: AA 331. Offered: W.

AA 360 Propulsion (4 QCH) Study of the aero- and thermodynamics of jet and rocket engines. Air-breathing engines as propulsion systems. Turbojets, turbofans, turboprops, ramjets. Aerodynamics of gas-turbine engine components. Rocket vehicle performance. Introduction to space propulsion. Prerequisite: AA 301. Offered: Sp.

AA 400 Gas Dynamics (3 QCH) Introduction to kinetic theory and free molecule flow. Review of thermodynamics. One-dimensional gas dynamics: one-dimensional wave motion, combustion waves. Ideal and real gas application. Prerequisite: PHYS 235; GENG 220 or equivalent: W.

AA 402 Fluid Mechanics (3 QCH) Inviscid equations of motion, incompressible potential flows, small perturbation flows, bodies of revolution, viscous equations, exact solutions, laminar boundary-layer equations, similar solutions, integral methods. Compressibility, instability, turbulent boundary layers. Prerequisite: MATH 2210; AA 301. Offered: A.

AA 410 Aircraft Design I (4-) Conceptual design of a modern airplane to satisfy a given set of requirements. Estimation of size, selection of configuration, weight and balance, and performance. Satisfaction of stability, control, and handling qualities requirements. Offered: W.

AA 411 Aircraft Design II (4 QCH) Preliminary design of a modern airplane to satisfy a given set of requirements. Estimation of size, selection of configuration, weight and balance, and performance. Satisfaction of stability, control, and handling qualities requirements. Prerequisite: AA 410. Offered: Sp.

AA 419 Aerospace Heat Transfer (3 QCH) Fundamentals of conductive, convective, and radiative heat transfer with emphasis on applications to atmospheric and space flight. Prerequisite: PHYS 235; MATH 2210. Offered: W.

AA 430 Finite Element Analysis in Aerospace (3 QCH) Introduction to the finite element method and application. One-, two-, and three-dimensional problems including trusses, beams, box beams, plane stress and plane strain analysis, and heat transfer. Use of finite element software. Prerequisite: GENG 305. Offered: A.

AA 432 Composite Materials for Aerospace Structures (3 QCH) Introduction to analysis and design of aerospace structures utilizing filamentary composite materials. Basic elastic properties and constitutive relations of composite laminates. Failure criteria, buckling analysis, durability, and damage tolerance of composite structures. Aerospace structure design philosophy and practices. Prerequisite: AA 332. Offered: Sp.

AA 440 Flight Mechanics I (3 QCH) Calculation of aerodynamic characteristics of aircraft and components including stability derivatives. Relation to wind tunnel and flight data. Vehicle equations of motion within the atmosphere, characteristics of propulsion systems and components including propellers. Prediction of performance, stability and control characteristics for a specific aircraft. Offered: W.

AA 447 Control in Aerospace Systems (4 QCH) Overview of feedback control. Linearization of nonlinear models. Model properties: stability, controllability, observability. Dynamic response: time and frequency domain techniques. Frequency response design techniques. Design of aerospace control systems via case studies. Prerequisite: MECH 310; MATH 2220. Offered: A.

AA 448 Control Systems Sensors and Actuators (3 QCH) Study of control systems components and mathematical models. Amplifiers, DC servomotors, reaction mass actuators. Accelerometers, potentiometers, shaft encoders and resolvers, proximity sensors, force transducers, piezoceramic materials, gyroscopes. Experimental determination of component models and model parameters. Two 3-hour laboratories per week. Prerequisite: AA 447. Offered: W.

AA 461 Advanced Propulsion (3 QCH) Physical characteristics and components of rockets. Nozzle gasdynamics and non-ideal flow effects. Solid and liquid propulsion systems, components, and design. Aerodynamics of airbreathing engine components: inlets, compressors, turbines, afterburners, nozzles. Engine design methodology. Prerequisite: AA 360. Offered: Sp.

AA 480 Systems Dynamics (3 QCH) Equations of motion and solutions for selected dynamic problems; natural frequencies and mode shapes; response of simple systems to applied loads. Prerequisite: AA 312. Offered: Sp.

Appendix E

Aerospace Graduation Requirements

Mathematics ---------- **21 cr**

MATH 124	Calculus with Analytic Geometry I
MATH 125	Calculus with Analytic GeometryII
MATH 307	Introduction to Differential Equations
MATH 308	Matrix Algebra with Applications
STAT 390	Probability and Statistics in Engineering and Science

Natural World----------**25 cr**

CHEM 142	General Chemistry with Lab
PHYS 121	Mechanics
PHYS 122	Electromagnetism and Oscillatory Motion
N.W. Electives 10 credits	

Engineering Fundamentals ----------**20 cr**

AA 210	Engineering Statics
CEE 220	Introduction to Mechanics of Materials
ME 230	Kinematics and Dynamics
AA 260	Thermodynamics
MSE 170	Engineering Materials

Written and Oral Communications ---------- **12 cr**

English Comp	Approved Arts & Science Engl. Composition list
HCDE 231	Introduction to Technical Writing
HCDE 333	Advanced Technical Writing and Oral Presentations
	or departmentally approved alternative. (Strongly recommended)

Visual Literary and Performing Arts & Individuals and Societies----------**24 cr**

From Arts and Sciences Areas of Knowledge List
Minimum 10 cr Visual, Literary and Performing Arts
Minimum 10 cr Individuals & Societies
4 additional credits from either area

` **300 Level Required Courses** ----------**44 cr**

AA 301 (4)	AA 302 (4)	AA 310 (4)	AA 311 (4)	AA 312 (4)	AA 320 (3)
AA 321 (3)	AA 322 (3)	AA 432 (3)	AA 331 (4)	AA 332 (4)	AA 360 (3)

400 Level Required Courses ----------**15 cr**

AA 410-411	Aircraft Design	(8) cr
AA 430	Finite Element Analysis	(3) cr
AA 447	Controls in Aerospace Systems	(4) cr

Senior Technical Electives ----------**15 cr**

AA 400	Gas Dynamics	AA 448 Control Systems Sensors & Actuators
AA 402	Fluid Mechanics	AA 461 Advanced Propulsion
AA 419	Aerospace Heat Transfer	AA 470 Systems Engineering
AA 440	Flight Mechanics	AA 480 System Dynamics

Free Electives ----------**4 cr**

Total Required Credits ---------- **180 cr**

Appendix F

Continuation Policy for UW-Seattle BSAAE Program

(Same for UW-Abu Dhabi BSAE Program)

While the University has general regulations governing scholastic eligibility for continuance, departments and programs in the College of Engineering have adopted additional requirements in order to make the best use of the limited facilities and resources available and to provide reasonable assurance of academic and professional success. The following criteria and procedures will be applied to all undergraduate students for determining continuance in the major program.

I. Basic Criteria

1. Full-time students are expected to complete a minimum of 12 or more credit hours per academic quarter applicable toward the degree. (An average of 15-16 hours per quarter is required to complete the graduation requirements in 12 quarters.)
2. Part-time attendance may be permitted in special cases. but only with prior approval. Written permission must be obtained from the Departmental Undergraduate Advisor or Faculty Advisor for any desired change in status. Application should be made prior to the first day of the quarter. Students who have received permission to attend part-time must complete at least one course applicable toward their degree each quarter.
3. A student who withdraws from the University without prior written approval or is dropped for non-payment of fees must obtain approval of the Undergraduate Advisor before registering or maintaining pre-registration for the following academic year. In such cases registration may be disallowed or canceled if the student's academic record is inferior to the cut-off level for admission prevailing at the time.
4. Any undergraduate student who has exceeded the requirements of the degree program by more than 15 credits and fails to make plans for graduation or received approval for alternative plans will be transferred to the College of Arts and Sciences, Undergraduate Advising Office.
5. a. A student whose grade point average in AA courses falls below 2.0 **in any academic quarter** will be subject to dismissal from the department.
   b. A student who accumulates two or more grades of less than 2.0 in the core AA courses in one or more academic quarters will be subject to probation. To be removed from probation status, the student must achieve grades equal to or greater than 2.0 in all AA courses the following quarter. Failure to achieve this performance level will subject the student to dismissal from the Department.
   c. Any student who accumulates two probationary quarters while enrolled in the Department will also be subject to dismissal.

Appendix G

College of Engineering Academic Misconduct Policy

Academic misconduct or violation of engineering ethics is unacceptable in the practice of engineering. When you graduate and practice as an engineer, you will be subject to the Code of Ethics of Engineers. While preparing to be an engineer, you are subject to specific rules regarding academic misconduct.

What does academic misconduct encompass?

- Cheating on examinations
- Cheating on individual projects
- Fraud
- Theft or alteration of other people's work on academic materials for the purpose of improving one's own grades or acquiring academic credit

What can happen if I am found guilty of academic misconduct?

Students accused of academic misconduct will be referred for disciplinary action pursuant to the University of Washington Student Conduct Code (Chapter 478-120 WAC). If found guilty, students are subject to sanctions which can include:

- Disciplinary Warning
- Probation
- Suspension
- Dismissal from the University

The College of Engineering (COE) expects all students to behave in a mature manner and to be responsible for their actions. The COE does not accept excuses for misconduct and will prosecute all allegations of misconduct according to the procedures outlined in the CoE Academic Misconduct Process.

What is Cheating?

Most academic misconduct falls under the definition of plagiarism (see below), but sometimes we refer to misconduct as cheating. The following is a list of several examples of cheating:

Examples of Cheating:

- Allowing another to prepare an assignment for you or preparing an assignment for another.
- Having another take an examination for you or taking an examination for another.
- Obtaining information about an examination or assignment that is not authorized by the instructor.
- Altering an answer to an examination after it has been turned in, whether it has been graded or not.

- Looking at another's paper during an examination or allowing another to look at your paper.
- Collaborating with another during an examination or on an assignment where the work is to be done independently.
- Bringing materials or information to an examination that are not permitted by the instructor.

What is Plagiarism?

Plagiarism is taking someone else's work from any source, i.e., someone's ideas, writings, or inventions, and using it WITHOUT ACKNOWLEDGMENT. As long as you give credit to the originator of the material, you are not guilty of plagiarism. Merely enclosing statements or sentences in quotation marks is not sufficient; you must cite the source.

Examples of Plagiarism:

- Copying phrases, sentences, sections, paragraphs, or graphics from a source and not giving credit by citing the source.
- Turning in a paper from a previous class.
- Having another person write an assignment (for pay or for free) and putting your name on it.
- Modifying or paraphrasing another's ideas or writings and submitting them as your own.
- Having someone make substantial editorial changes to your paper and submitting the final version as your own.
- Turning in someone else's solution to an exam or a question on an exam as your own.
- Sharing computer code in assignments for individual students; use of someone else's computer code without acknowledgement; use of someone else's computer code when it is prohibited by the instructor.

Examples that are *not* Plagiarism:

- Asking someone to read your assignment and suggest possible improvements, unless specifically forbidden by the instructor.
- Getting together with other students to discuss an assignment, unless specifically forbidden by the instructor.
- Asking your instructor for help with an assignment.
- Quoting extensively from another's work but giving credit.

Why is it so important?

Copying (or plagiarizing) someone's work, without giving due recognition, is regarded as the equivalent of **STEALING AND FRAUD**. It is highly probable that it will be detected, so do not do it under any circumstances. It could ruin your career.

How can I avoid Plagiarism?

ALWAYS make very clear reference to the source of the material you use and put the material taken in "quotation marks."

DO NOT try to rewrite or change another person's work and pass it off as your own - this is very difficult to do and is easily detected.

When can I use other people's work?

You can always use published writings as long as you give a formal reference and acknowledgment of the source. If the information comes from a conversation with a professor or another student, give their name and recognition that it is their thought.

Again, **NEVER** take another person's writing or speech or message or Internet data and put it in your work without acknowledgment. It is important to always make sure in your career that everyone who makes a contribution gets credit, no matter how small their part has been!

If you have questions, please check with your instructor or TA.

What can happen if I commit Plagiarism?

At a **MINIMUM** the Professor will give you a very poor grade and will report the incident to the Associate Dean in the College of Engineering. Please refer to the Student Conduct Code of the Washington Administrative Code for a list of the possible sanctions that may be imposed.

Questions about Cheating/Plagiarism

If you have any questions about the above process, please check with your instructor, TA, or departmental advising center.

Undergraduate Curriculum Review Process for New Programs

Seattle: Bachelor of Science in Aerospace Engineering degree (AA-20110301)

uwcr
uwcr
Board owner

Edited Apr 26, 2011 9:54 AM by uwcr (Board owner)

Please review the attached 1503 pdf requesting to establish a Bachelor of Science in Aerospace Engineering degree and post comments by 5:00 pm on Wednesday, May 11.

If you have any problems viewing the attachment, please contact the University Curriculum Office at uwcr@uw.edu.

Attachments:

AA-20110301.pdf 20.0M Download View

rstanton
ROBERT B STANTON

I think this is a good idea. My field was English, so my perspective is limited—but not altogether limited, since I have taught in several other countries (Japan, Taiwan, the Philippines, Germany). In addition to the new program's normal educational value, it will encourage understanding and good feelings in both directions, in a region where misunderstanding & ill feelings are almost the norm.

Robert Stanton, Assoc. Prof. Emeritus (English)

d6423
DONALD J. JANSSEN

I am not sure I understand the need for this program. Where will the graduates of this very focused degree program get jobs? Since I am not aware of an existing aerospace industry in Abu Dhabi, I assume these graduates will need to leave the country. Which seems like we are promoting "brain-drain".
Or if these essentially U.S.-trained aerospace engineers stay there and work for U.S. companies, it appears that we are promoting more "off-shoring" of U.S. jobs.

So I am not sure of the purpose of this program.

Don Janssen

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uwcr
uwcr
Board owner

This generally sounds good to me but i found the section describing faculty in the program to be fairly nebulous. it is unclear how many permanent uw aa faculty quarters would be spent per year at this foreign site and unclear what impact these absences would have on existing aa programs. while i think it is fine to extend the educational impact of uw aa to this new venture, it is maybe not so fine for uw students who will as a result not have access to uw facutly for extended periods.

i would lie to see a careful analysis of impact on current uw seattle programs, including expected factulty quarters per year.

Thomas A Horbett