

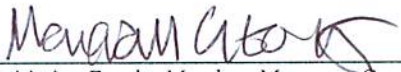


Program or certificate title: **Pre-Engineering**

New degree certificate *OR*

Program deletion *OR* Major revision *OR* To offer existing program outside the state of Alaska

Approval Signatures:


Initiating Faculty Member, Marquam George

01/20/08
Date

N/A
Chair of Faculty Group,

Date


Dean, Karen Schmitt

1/25/08
Date


Faculty Senate President, Cathy Connor

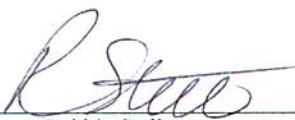
01/31/08
Date


Curriculum or Graduate Committee Chair, Michael Boyer

1/29/08
Date


Registrar, Barbara Hegel

1/25/2008
Date


Provost, Robbie Stell

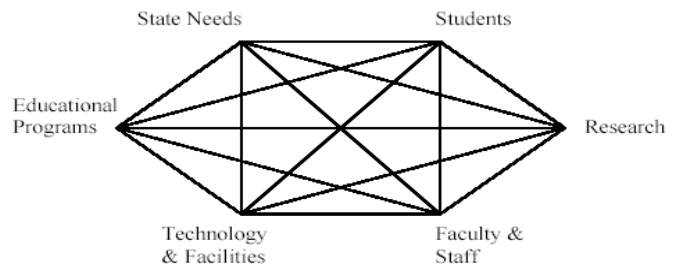
1-31-08
Date

University of Alaska Board of Regents
Program Approval Summary Form

Requirements:

1. 2 pages or less
2. Must be a stand-alone document

MAU: University of Alaska Southeast
Title: Certificate in Pre-Engineering
Target admission date: Fall 2008



How does the program relate to the **Education** mission of the University of Alaska and the MAU?

The Certificate in Pre-Engineering (CPE) supports the admission, advising, retention, and transfer of UAS undergraduates for the Bachelors of Science in Engineering (BSE) program with options for computer, mechanical or electrical engineering. The certificate prepares students academically to transfer to the UAA BSE program; additional transfer agreements are being developed for each of the engineering programs at UAA and UAF.

The Certificate in Pre-Engineering supports the UA and UAS missions to inspire learning and student achievement through teaching of and access to high-quality academic programs. The CPE supports the UA and UAS strategic plan goals for student success, educational quality and responsiveness to State needs. The certificate directly supports the UA system goal of doubling the number of BS Engineering graduates within the State by 2012/2013. The CPE is a component of UAS's regional strategy to provide preparation for and access to additional high-demand degree programs through academic partnerships within the UA system.

What **State Needs** met by this program.

The Certificate in Pre-Engineering supports the State need for undergraduate preparation aligned to support the UA system goal of doubling the number of high-demand graduates in engineering. This program has been planned and cooperatively developed as a part of the UA engineering initiative to respond to the documented workforce needs of industry and agency employers for additional qualified engineers in Alaska.

What are the **Student** opportunities and outcomes? Enrollment projections?

The Certificate in Pre-Engineering provides opportunities for UAS students to prepare academically for successful transfer to the UAA BSE program. Additional transfer agreements are in development and will provide transfer opportunities into the engineering programs at UAA and UAF. UAS's Pre-Engineering Industry Advisory Committee strongly supports hiring Alaskan engineering graduates. Students graduating with an engineering degree from UAA or UAF will be heavily recruited for job opportunities within the Southeast region. The CPE will catalyze outreach and recruitment strategies to increase student opportunities in science, technology,

engineering and math (STEM). Academic partnerships with regional high schools offer opportunities for dual-enrollment and tech-prep studies encouraging students to pursue pre-engineering studies and careers in engineering.

Enrollment projections for this new certificate are anticipated to be modest in the initial years with expected growth as the program becomes established in the region. An initial admission of 3-5 students is anticipated with an annual average admission goal of 8 FTE students, with 5 full time (12-15 credits/year) and 6 part-time (.5 FTE; 6-9 credits/semester) students admitted per year. Total enrollment of majors per semester is projected to hit a steady-state of 17 by AY12, this number remaining relatively steady as students complete the Certificate and/or transfer to programs at UAA, UAF, or outside of Alaska.

Describe **Research** opportunities:

The UA Transportation Research Center (AUTC) will provide new and expanded opportunities for statewide collaborations for UAS faculty and students. Existing partnerships could be expanded for applied research with the UAS Environmental Technology program and the Alaska Training/Technical Assistance Center (ATTAC) at UAS Sitka. ATTAC funds applied research on issues relating to rural water supply and treatment conducted by the engineering programs at UAA and UAF. UAS Construction Technology has an ongoing applied research partnership with the Cold Climate Housing Research Center (CCHRC). CCHRC is an industry based, non-profit corporation created to facilitate the development, use, and testing of energy efficient cost effective building technologies for Alaska and the world's cold climate regions.

Describe Fiscal Plan for development and implementation:

UAS has added faculty workload (1.3 FTE) and staff advising time (.25 FTE) for program teaching, advising, coordination, recruitment and outreach. Program faculty resources focus on: coordinating curriculum with the Schools of Engineering at UAA and UAF; identification of students already at UAS seeking pre-engineering preparation; developing regional career awareness of engineering educational opportunities; UA/UAS recruitment for engineering programs; and industry partnerships for program support.

The Certificate of Pre-Engineering will add the ENGR 151 *Engineering Practices I* and ENGR 161 *Engineering Practices II* courses to the Juneau campus instructional program. This coursework will require the addition of MATLAB software licenses to the existing UAS computer laboratories on the Juneau campus; licensing and installation will be in place by Fall 2008. The cost of this additional software will be supported by the Pre-Engineering initiative funding and computer laboratory/technology fees.

New degree or certificate program proposal: Certificate in Pre-Engineering (UAS)

1. degree or certificate title, university unit responsible for program

Certificate in Pre-Engineering (UAS)

2. educational objectives and rationale for the new program;

The Certificate in Pre-Engineering supports a UAS pre-engineering program initiative for the admission, advising, retention, and transfer of UAS undergraduates to the Bachelors of Science in Engineering (BSE) program with options for computer, mechanical or electrical engineering. The objective of this certificate is to prepare students academically for a successful transfer to the UAA BSE program; additional certificate tracks are being developed to provide transfer pathways for each of the engineering programs at UAA and UAF Schools of Engineering.

The UAS pre-engineering initiative includes outreach and recruitment strategies to increase pre-college student opportunities at UAS through academic partnerships with regional high schools. By developing more opportunities for dual-enrollment and tech-prep studies in science, technology, engineering and mathematics (STEM) more students will choose to pursue pre-engineering studies and enter engineering careers. UAS's Pre-Engineering Advisory Committee strongly supports hiring Alaskan engineers and they have affirmed that UAS students that go on to graduate in engineering from UAA or UAF will be strongly recruited for job opportunities within the Southeast region.

3. relevance to the university or community college mission, goals, and objectives;

The Certificate in Pre-Engineering program supports the UA and UAS missions to inspire learning and student achievement through teaching and access to high-quality academic programs. The certificate supports the UA and UAS strategic plan goals for student success, educational quality and responsiveness to state needs. The certificate directly addresses the UA system goal of doubling the number of BS Engineering graduates within the State. This program is a component of UAS's regional strategy to provide preparation for and access to additional high-demand degree programs through academic partnerships within the UA system.

4. collaboration with other universities and community colleges within the University of Alaska;

The Certificate in Pre-Engineering is an academic collaboration between UAS and the UAA and UAF Schools of Engineering. In planning the certificate the faculty and administration of the UAS Schools of Career Education and Arts & Sciences have worked closely with the UAA and UAF Schools of Engineering. The program has benefited greatly from the support and assistance of Grant Baker, Program Chair, Bachelor of Science in Engineering (BSE) program, UAA School of Engineering; Rob Lang, Dean, UAA School of Engineering; Richard Williams, Dean, UAF School of Engineering; Billy Conner, Director, Alaska

University Transportation Center (AUTC) and Herb Schroeder, Director, Alaska Native Science and Engineering Program (ANSEP).

5. if at the graduate level, identification of other universities in the WICHE region which offer similar programs and an explanation why it is necessary to provide a similar offering in Alaska;

Undergraduate program; item 5 is not applicable.

6. demand for program, relation to state of Alaska long-range development, relation to other programs in the University of Alaska that may depend on or interact with the proposed program;

In 2003 the Institute of Social and Economic Research completed a survey of community and industry needs for engineers, [*University of Alaska Engineering Programs: a Community View*](#). This statewide needs assessment documented the growing workforce needs of industry and agency employers for additional qualified engineers in Alaska.

The Certificate in Pre-Engineering was planned and cooperatively developed as a part of the statewide academic plan to address the workforce needs for engineers by strengthening and expanding programs in the UAA and UAF Schools of Engineering. The certificate plays a key role in developing a "1+3" undergraduate program at UAS for the recruitment, instruction, advising and transfer of pre-engineering students. The certificate program directly supports the state need for undergraduate preparation aligned to support the UA system goal of doubling the number of high-demand graduates in engineering by 2012/2013.

7. outline of schedule for implementation of the program;

Fall 2006 – UAS Career Education secures three-year, \$100K Workforce Development (WFD) funding for the Certificate in Pre-Engineering program; UAS Faculty Senate approves certificate proposal for program development

Spring 2007 – faculty workload added to Construction Technology program to begin development of the certificate program; Advisory Committee formed and convened for its first meeting

Fall 2007 – faculty workload added to Natural Sciences program to support certificate development; UAS Curriculum Committee reviews and approves certificate proposal; UAS Pre-Engineering initiative funding (\$100K) is included in the UA FY09 Operating Budget (Redbook)

Spring 2008 – SAC review of certificate proposal; BOR approval of certificate; student recruitment for the program begins and admissions open with the publication of the 2008-09 UAS Catalog.

Fall 2008 – first certificate students enroll at UAS in Juneau; ENGR 151 *Engineering Practices I* offered; 1 FTE faculty position in Natural Sciences dedicated to pre-engineering program recruitment, instruction, advising and community outreach; FY09 pre-engineering initiative funding in place.

Spring 2009 – ENGR 161 *Engineering Practices II* offered; first certificate student completions possible, transfers of some certificate majors to UAA and UAF is anticipated after the program’s first year (prior to students fully completing the certificate)

Fall 2009 – Certificate is fully integrated into UAS’s recruiting, advising, retention and transfer activities with average annual admission goal of 8 FTE students per year. The retention goal for students in the program is to meet the UAS PBB targets for retention of first-time, full-time freshmen.

8. projection of enrollments (FTE (full-time equivalent) and headcount) and graduates over next five years;

Enrollment projections for this new certificate are anticipated to be modest in the initial years but growth is expected as the program becomes established in the region. An initial admission of 3-5 students is anticipated with an annual average admission goal of 8 FTE students, with 5 full time (12-15 credits/year) and 6 part-time (.5 FTE; 6-9 credits/semester) students admitted per year. Total enrollment of majors per semester is projected to hit a steady-state of 17 by AY12, this number remaining relatively steady as students complete the certificate and/or transfer to programs at UAA, UAF, or outside of Alaska. Program success will be assessed by the percentage of students that graduate and/or transfer to a baccalaureate engineering program or are retained with a change of major (COM) that aligns with their personal study plan; the program retention goal is to match the UAS PBB target for retention of first-time, full-time freshman by 2012 (70%).

UAS Certificate in Pre-Engineering Student enrollment	2008-2009	2009-2010	2010-2011	2011-2012	2012-2013
full time students 12-15 credits/semester	5	5	5	5	5
part time students 6-9 credits/semester	6	4			
		6	4		
			6	6	
				6	6
Headcount	5	15	16	17	17
FTE	8	11	11	11	11
Graduates/ UA Transfers/COM	3	7	8	8	8

9. availability and quality and/or requirement for new faculty and/or staff to support the program;

To support the initial development of the Certificate in Pre-Engineering, UAS has collaborated with dedicated faculty workload in Construction Technology and Natural Sciences. Program faculty have focused on: developing and coordinating curriculum with the Schools of Engineering at UAA and UAF; identification and advising of students already at UAS seeking pre-engineering preparation; developing regional career awareness of engineering educational opportunities; outreach and recruitment for UA/UAS engineering programs; and regional industry partnerships for program support.

The certificate contains transferable coursework for engineering studies, primarily in the sciences, mathematics and GERs. UAS's School of Arts and Sciences currently offers all of the necessary natural sciences and general studies courses proposed for this certificate. Existing UAS courses have sufficient enrollment capacity to accommodate the anticipated growth in enrollments from the certificate program. Two new engineering-specific program courses, ENGR A151 *Engineering Practices I* and ENGR A161 *Engineering Practices II*, are being developed in collaboration with UAA School of Engineering to be offered starting in the fall of 2008. These courses will be taught by a qualified UAS faculty member or an adjunct faculty member recruited from the professional engineering community in Juneau. Once established, the certificate will be supported with faculty and staff workload shared between Natural Sciences and Construction Technology.

10. library, equipment, and similar resource requirement, availability, appropriateness, and quality;

The Certificate in Pre-Engineering will add the ENGR 151 *Engineering Practices I* and ENGR 161 *Engineering Practices II* courses to the Juneau campus instructional program. This coursework will require the addition of MATLAB software licenses to the existing UAS computer laboratories on the Juneau campus; licensing and installation will be in place by fall 2008. The cost of this additional software will be supported by the Pre-Engineering initiative funding and computer laboratory/technology fees.

11. new facility or renovated space requirements;

No new or renovated facilities are required for implementing the Certificate in Pre-Engineering program.

12. projected cost of items 9, 10, and 11 and budgetary plan for acquiring resources;

The fiscal plan for the pre-engineering initiative has two components. The first phase of the funding for the program at UAS is the Workforce Development (WFD SB-137) funding awarded in FY07 for three years (FY07-09) at the level of \$100,000/year. The funding has supported the School of Career Education to staff the start-up phase of the program and has funded faculty, advising staff, and technology upgrades needed to facilitate the UAA/UAF partnership in delivering pre-engineering instruction at UAS. Activities have concentrated on developing the academic certificate and transfer agreements; building regional career awareness for engineering and related professions;

UA/UAS recruitment in the Southeast region; identification and advising of students already enrolled at UAS taking pre-engineering courses for transfer preparation.

The second component of the budget plan is the \$100,000 funding request included in the UA FY09 Operating Budget request to replace the WFD start-up funding. With these operating funds replacing the WFD funding UAS will add a full-time faculty FTE in Juneau to teach the introductory engineering courses that are part of the certificate; provide program advising; coordinate transfer agreements with UAA/UAF Schools of Engineering; and teach related science, technology and math courses within the Natural Sciences department.

13. consultant reviews, reports from visitations to other institutions, or names and opinions of personnel consulted in preparing the proposal;

In the planning of this certificate curriculum in 2004-06, Faculty and Deans from the UAS Schools of Career Education and Arts & Sciences have worked collaboratively with the UAA and UAF Schools of Engineering, specifically with Grant Baker, Program Chair, BS Engineering, UAA School of Engineering; Dean of Engineering Rob Lang; UAF Dean of Engineering Richard Williams; and Herb Schroeder, UAA Director of Alaska Native Science and Engineering Program (ANSEP). UAS has also participated in meetings with the UA Statewide academic planning for engineering expansion with Senior Associate Vice President for Academic Affairs Ted Kassier, Vice President of Academic Affairs Craig Dorman, UAF Provost Paul Reichert, and UAA Interim Provost Jan Gehler. Community input, including meetings conducted with engineering professionals in Southeast, has been an integral part of the development process. Many individuals, school districts and professional organizations have offered their support and resources for assistance in this UAS pre-engineering initiative. During 2006 and 2007 UAS faculty have visited the faculty and staff at both the UAA and UAF Schools of Engineering to develop transfer pathways for each engineering program in the state.

14. concurrence of appropriate advisory councils;

In December 2005 the Vice President of Academic Affairs and Research convened a meeting of the UA Statewide Academic Council (SAC), the Deans of the Schools of Engineering at UAA and UAF, the Deans of the Schools of Arts & Sciences and Career Education to endorse the development of a transfer program at UAS to support the growth of UA engineering programs. In March 2007 UAS faculty convened the first meeting of the UAS Pre-Engineering Advisory Committee, composed of professional engineers from the Southeast region, to review the certificate curriculum and discuss the program concept and implementation plan. The Committee heartily endorsed the program plan for the Certificate in Pre-Engineering and UAS' related academic activities to encourage more Southeast youth to prepare for careers in engineering and related professions.

15. an executive summary of about one page

Pre-Engineering Certificate

This certificate will start the student toward a Bachelors of Science in Engineering (BSE) and will facilitate transfer to an engineering program of their choice in their second year of a four year curriculum in engineering. The certificate coursework concentration is on mathematics, science and general education requirements. Three pre-engineering certificate pathways are available with basic requirements that span the foundations of engineering disciplines. Pre-engineering certificate students select courses for a specialization track that best suits their needs.

The Computer Systems Engineering (CSE) emphasis track focuses on applied computer theory and networking. Students take courses such as signals, systems, computer hardware design, assembly programming, and electronic device design.

Certificate Requirements	Minimum Credit Hours	30
ENGL 111	Methods of Written Communication	3
ENGL 212	Technical Writing	3
COMM 111	Fundamentals of Oral Communication	3
MATH 200	Calculus I	4
MATH 201	Calculus II	4
CHEM 105	General Chemistry I	4
CIOS 170	Programming Fundamentals	3
ENG 151	Engineering Practices I	3
ENG 161	Engineering Practices II	3

The Electrical Engineering (EE) emphasis track focuses on applied circuit design and theory. Students take courses in electrical signals and systems, circuit design, and communication systems.

Certificate Requirements	Minimum Credit Hours	30
ENGL 111	Methods of Written Communication	3
ENGL 212	Technical Writing	3
COMM 111	Fundamentals of Oral Communication	3
MATH 200	Calculus I	4
MATH 201	Calculus II	4
CHEM 105	General Chemistry I	4
CIOS 170	Programming Fundamentals	3
ENG 151	Engineering Practices I	3
ENG 161	Engineering Practices II	3

The Mechanical Engineering (ME) emphasis track focuses on heat transfer and machine design. Students take courses in heat transfer, HVAC (Heating, Ventilation, and Air Conditioning), and machine design.

Certificate Requirements	Minimum Credit Hours	31
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ENGL 111	Methods of Written Communication	3
ENGL 212	Technical Writing	3
COMM 111	Fundamentals of Oral Communication	3
MATH 200	Calculus I	4
MATH 201	Calculus II	4
CHEM 105	General Chemistry I	4
CHEM 106	General Chemistry II	4
ENG 151	Engineering Practices I	3
ENG 161	Engineering Practices II	3