



College of Engineering

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Date: 7 October 2010

To: Randy Smith  
Vice Provost, Office of Academic Affairs

From: Ed McCaul   
Secretary, College of Engineering Committee on Academy Affairs (CCAA)

Subject: Semester Conversion Proposals for the BS, BS/MS, MS, and PhD  
degrees in Aeronautical and Astronautical Engineering

Attached is a letter from K. (Cheena) Srinivasan, Department Chair of  
Mechanical and Aerospace Engineering, as well as semester conversion  
proposals for their BS, BS/MS, MS, and PhD degree programs in Aeronautical  
and Astronautical Engineering.

These proposals were reviewed by a subcommittee of CCAA. After  
reviewing the proposals and having some changes made to them the  
subcommittee recommended to the full committee that they be approved. After a  
discussion, CCAA unanimously approved the proposals on the 27<sup>th</sup> of September  
2010 and requested that I forward the proposals to you for consideration by CAA.  
If you have any questions concerning these proposals please let me know.



**Department of Mechanical  
and Aerospace Engineering**

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**To:** Office of Academic Affairs

**From:** K. (Cheena) Srinivasan   
Chairperson, Department of Mechanical and Aerospace Engineering

**Date:** August 31, 2010

**Re:** Semester Program Proposals for *BS, MS, PhD, and BS/MS in Aeronautical and Astronautical Engineering*

The faculty of the *Aeronautical and Astronautical* Engineering programs have worked diligently since early August 2009 to prepare the attached proposals. In addition to discussions at monthly faculty meetings during the Fall 2009 and Winter 2010 quarters, the faculty dedicated an entire workday to this proposal following the Fall 2009 final exam period. As part of the evaluation process, program data were obtained for 4-5 peer institutions all operating on semesters. Specific needs for each discipline were addressed in smaller break-out groups while the final form of the proposal was a matter of intense discussion by the entire faculty. Early in the process, input was sought from all current students via email and open discussion forums. Student responses to the proposed changes were generally positive. During the Spring quarter, the faculty voted to approve these attachments as our semester plans for the undergraduate and graduate degree programs in Aeronautical and Astronautical Engineering. The vote results were: 10 for, 0 against, 0 abstained. In June, comments were received from CCAA. These comments have been incorporated into the proposals.

The AAE programs reside within the Department of Mechanical and Aerospace Engineering (MAE) following the merger of the Department of Aerospace Engineering and the Department of Mechanical Engineering earlier this year. Listed with each one is its current status relative to semester conversion.

- *PhD in Aeronautical and Astronautical Engineering* (a graduate program in Engineering; the revised program proposal is attached)
  - *MS in Aeronautical and Astronautical Engineering* (a graduate program in Engineering; the revised program proposal is attached)
  - *BS in Aeronautical and Astronautical Engineering* (an undergraduate program in Engineering; the revised program proposal is attached)
  - *BS/MS program in Aeronautical and Astronautical Engineering* (an undergraduate/graduate program in Engineering; the revised program proposal is attached)
- None of these academic programs is being withdrawn. All will be converted to semesters.

I hereby recommend that the attached proposals be approved.

# Aeronautical and Astronautical Engineering (AAE) Program Proposal

Primary Contact: Jeffrey Bons (bons.2).

## 1. **Name of Program**

Aeronautical and Astronautical Engineering.

## 2. **Name of Degree**

Bachelor of Science in Aeronautical and Astronautical Engineering (BSAAE).

## 3. **Responsible Academic Unit**

Department of Mechanical and Aerospace Engineering.

## 4. **Type of Program**

a. Undergraduate bachelors degree program.

## 5. **Semester Conversion Designation**

Minimal changes to curricular requirements (core requirements, new courses), but no changes to program goals.

## 6. **Program Learning Goals**

Because of a requirement to use the terminology of the AAE program's accrediting body (ABET, Inc.), program goals are separated into "educational objectives" and "outcomes". Roughly speaking, the former describe what program graduates will be doing a couple years after graduation, while the latter describe knowledge and skills they will attain by the time of graduation.

The *program educational objectives* of Aeronautical and Astronautical Engineering are to matriculate graduates who conduct themselves in a responsible, professional and ethical manner (citizenship), and who upon the years following graduation, are engaged in:

### 1. **Discovery**–

- actively embracing leadership roles in the practice of engineering in industry and government organizations (including both traditional and emerging technical areas).
- research and development across disciplines (via graduate study or industry) to advance technology and foster innovation in order to compete successfully in the global economy.
- applying their engineering problem solving skills to less-traditional career paths (e.g., law, medicine, business, start-up ventures, and public policy, etc.).

### 2. **Learning**–

- actively participating in professional development opportunities (conferences, workshops, short courses, graduate education, etc.).
- updating and adapting their core knowledge and abilities to compete in the ever changing global enterprise.
- developing new knowledge and skills to pursue new career opportunities.

### **3. *Engagement***–

- serving as mentors for the engineering profession, helping others develop a passion for engineering.
- exchanging and applying knowledge to create new opportunities that advance our society and solve a variety of technical and social problems.
- entrepreneurial ventures and fostering activities that support sustainable economic development that enhance the quality of life of people in the State, across the country, and around the world.

The *program outcomes* of the BSAAE program are that students will attain:

- a) An ability to apply knowledge of mathematics, science, and engineering
- 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
- 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 responsibility
- g) An ability to communicate effectively
- h) The broad education necessary to understand the impact of engineering solutions in global and societal context
- i) A recognition of the need for, and an ability to engage in life-long learning
- j) A knowledge of contemporary issues
- k) An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

### **7. *Proposed Program Requirements***

See Attachment #1

### **8. *Current and Proposed Advising Sheets***

See Attachment #2 (current advising sheet) and #3 (proposed advising sheet)

### **9. *Curriculum Map***

See Attachment #4

### **10. *Rationale for Program Changes and Description of Changes***

The major change in the undergraduate program is the addition of a yearlong projects lab in the senior year in lieu of the current three quarter laboratory course sequence. The current sequence is made up of semi-canned experiments that student perform late in their academic career and out of context with the course material they depend on. Furthermore, while the students work in teams in the senior capstone, paper, design course, they don't get any experience in actually designing, building and testing in a laboratory environment.

As a result, it was decided to change the laboratory experience as follows:

- 1) The current senior lab experiments will be performed stripped down to their bare essentials as homework problems in the relevant courses they depend on.
- 2) A new, yearlong, projects lab course will be offered in the senior year where students will work in teams on a project that includes conception, design, construction and testing.
- 3) The content of two courses, MSE 205 and ISE 504 are partially dropped from the new program. Most of the materials topics in MSE 205 are already covered in AAE 542 and will be included in the succession course to 542. The material in ISE 504 which was primarily of an economic nature, will not be required in the new program, but students may elect to take the new version of ISE 504 or an equivalent if they so desire.
- 4) Systems Integration I, II and III (AAE 512, 512 and 514) are dropped. The intent of these courses, i.e. in integrating accumulated knowledge to a design or problem solution, will be satisfied by the new projects courses.

### **11. Input for program changes**

To date, input to the proposed program changes was sought from all current undergraduate students. Two e-mailings with the new course requirements was sent to members of SGT (13 responses) and then to all students (8 responses). The responses can be summarized as follows:

- 1) Most students were happy to see that MSE 205 and ISE would be dropped.
- 2) All students were positive, if not enthusiastic, about the proposed senior projects lab sequence.

Input from the IAC (Industrial Advisory Committee) will be sought in the upcoming autumn meeting.

### **12. Credit Hour Changes**

In Engineering, all cr-hrs other than GEC (or General Education) are counted as part of the “major program”; they are divided into a number of categories within the major program. The ranges of values in required courses offered inside and outside AAE arise from allowing flexible options in technical electives with bounds on the number of inside/outside cr-hrs.

	Number of qtr-cr-hrs in current program	Calculated result for 2/3 of current qtr-cr-hrs	Number of sem-cr-hrs required for proposed program
Total cr-hrs required for completion of program	187	125	128
Prerequisite cr-hrs required for admission to program which are not counted toward total hours	0	0	0
Required cr-hrs offered by the unit	87	58	63
Required cr-hrs offered outside of the unit	100	67	65
Double-counted cr-hrs that meet two or more requirements (e.g., prerequisites, General Education courses, and/or program requirements)	0	0	0
Free elective cr-hrs	0	0	0

**13. Rationale for Significant Change in Credit Hours**

Not applicable.

**14. Transition Policy**

No AAE major who began the degree program under quarters will have progress toward graduation impeded by the transition to semesters. Graduation requirements beginning Autumn 2012 will be those in force for AAE majors under semesters; but *every* quarter-credit-hour that would have counted toward the AAE major under the quarter-based AAE program will count (as 2/3 of a semester-credit-hour) toward the requirements for graduation under the semester-based AAE program. Additional advising support will be provided for AAE majors to assist in planning course schedules for the last year of quarters (2011-2012) and for at least the first year of semesters (2012-2013). If it is determined that the “normal” conditions covered by the AAE major transition worksheet would result in a particular student facing an unavoidable delay in graduation compared to quarters due to the change to semesters—rather than the student’s failure to meet with an advisor to complete the worksheet or to make satisfactory progress through the program—then a revision of specific requirements will be worked out for that student by the advising staff with approval by the AAE Undergraduate Studies Committee.

The transition policy is based on the following principles:

- The switch to semesters will impede no student’s progress toward graduation.
- Students that entered the program under the quarter system, i.e. before the autumn of 2012, may graduate with 125 semester credit hours (equivalent to the 187 quarter credit hours) rather than the 128 required by the semester plan.
- Each semester program requirement may be met either by taking an appropriate semester course (or sequence), or by substituting a substantially equivalent quarter course (or sequence) for the corresponding semester course (or sequence).
- Excess equivalent semester credit-hours resulting from such substitutions will be credited against technical elective requirements.
- Deficit equivalent semester credit hours resulting from such substitutions will be made up through additional technical electives.

The table at Attachment #5 indicates the proposed transition worksheet.

**15. Assessment Practices**

We have implemented a carefully developed assessment plan that we have used over many years. Details of the plan are discussed in item 15 (submitted via the assessment plan survey form). All of the essential components of the plan will be carried over to the new program as we switch to the semester system, as they are not impacted by the change to semesters.

**16. Assessment Plan on File with OAA**

Yes.

**Attachment #1: BSAAE Proposed Program Requirements**

<b>General Education</b>	<b>Course Number</b>	<b>Cr-hrs</b>	<b>Completed</b>
Writing Level 1		3	
Writing Level 2		3	
Literature		3	
Arts		3	
Historical Study		3	
Social Science 1		3	
Social Science 2		3	
Culture & Ideas: Ethics		3	
Total Liberal Arts Portion of Gen Ed cr-hrs		24	
<b>Engineering Core</b>	<b>Course Number</b>	<b>Cr-hrs</b>	<b>Completed</b>
Engineering Survey		1	
Introduction to Engineering I		2	
Introduction to Engineering II		2	
Engineering Calculus I		5	
Engineering Calculus II		5	
Physics I		5	
Total Engineering Core cr-hrs		20	
<b>AAE Core</b>	<b>Course Number</b>	<b>Cr-hrs</b>	<b>Completed</b>
Physics II		5	
Gen Chem for Engineers		4	
Programming		3	
Math III		3	
Math IV		3	
Electrical Circuits	EE	3	
Applied Mech I - Statics	ME 2010	2	
Applied Mech II - Dynamics	ME 2030	3	
Intro to Aero I	AAE 2200	4	
Intro to Aero II	AAE 2201	4	
Themrodynamics	AAE 2405	3	
Heat Transfer	AAE 3580	3	
Math Meth	AAE 3581	3	
Structures I	AAE 3542	3	
Structures II	AAE 3543	3	

Controls I	AAE 3520	3	
Controls II	AAE 3521	3	
Fluids I	AAE 3536	3	
Fluids II	AAE 3570	3	
Propulsion	AAE 4550	4	
Projects I	AAE 4510	2	
Projects II	AAE 4511	2	
Total AAE Core cr-hrs		69	
<b>AAE Core Choices</b>	<b>Course Number</b>	<b>Cr-hrs</b>	<b>Completed</b>
Capstone I: Aero or Space option	AAE 4515/4517	3	
Capstone II: Aero or Space option	AAE 4516/4518	3	
Total AAE Core Choices cr-hrs		6	
<b>AAE Technical Electives</b>	<b>Course Number</b>	<b>Cr-hrs</b>	<b>Completed</b>
Technical Electives		9	
Total AAE Technical Electives cr-hrs		9	
<b>Grand Total</b>		128	



**Attachment #2: Current BSAAE Advising Sheet**

The curriculum map (advising sheet) for the existing quarter program is shown below:

YEAR	AUTUMN	WINTER	SPRING
1	Math 151 (Calc & Anal Geom) .....5____ Chem 121 (Gen Chem) .....5____ Eng 181 (Intro to Eng I).....3____ Eng 100 (Eng Survey) .....1____	Math 152 (Calc & Anal Geom) ..... 5____ Physics 131 (Particles & Motion) ... 5____ Eng 183 (Intro to Eng II)..... 3____	Math 153 (Calc & Anal Geom) ..... 5____ Physics 132 (Elec & Mag) ..... 5____ EnGraph 167 (Prob Solv & Progr) . 4____
2	<b>AAE 200</b> (Intro to AAE I) .....5____ Math 254 (Calc & Anal Geom) .....5____ Physics 133 (Waves & Quant Phy) .5____	<b>AAE 201</b> (Intro to AAE II) ..... 5____ Math 415 (Ord & Part Diff Equa) ..... 4____ ME 410 (Statics)..... 4____ MSE 205 (Intro to MSE)..... 3____	<b>AAE 405</b> (Thermodynamics) ..... 4____ <b>AAE 580</b> (Analy Methods in AAE) ... 4____ ME 430 (Dynamics)..... 4____
3	<b>AAE 542</b> (Flight Vehicle Struc I)..... 4____ <b>AAE 520</b> (Flight Vehicle Dynamics).. 4____ <b>AAE 530</b> (One-Dim Gasdynamics)... 4____ <b>AAE 581</b> (Numer Methods in AAE) .. 3____ <b>AAE 512</b> (Systems Integration I) ..... 1____	<b>AAE 543</b> (Flight Vehicle Struc II)..... 4____ <b>AAE 560</b> (Fund of Aerodynamics) ... 4____ <b>AAE 513</b> (Systems Integration II) .... 1____ EE 300 (Electrical Circuits)..... 3____ EE 309 (Electrical Circuits Lab)..... 1____	<b>AAE 570</b> (Visc Flow & Heat Trans).. 4____ <b>AAE 550</b> (Princ Flight Veh Prop) ..... 4____ <b>AAE 521</b> (Linear Systems Eng)..... 4____ <b>AAE 514</b> (Systems Integration III)... 1____ ISE 504 (Eng Econ Analysis) ..... 3____
4	<b>AAE 510.01</b> <sup>1</sup> (AAE Lab I) .....2____ <b>AAE 515</b> (Prelim Des Flight Veh) .... 3____ <b>AAE Technical Elective</b> ..... 3____	<b>AAE 510.02</b> <sup>1</sup> (AAE Lab II) ..... 2____ <b>AAE 516</b> (Prelim Des Flight Veh) .... 3____ <b>AAE Technical Elective</b> ..... 3____	<b>AAE 510.03</b> <sup>1</sup> (AAE Lab III).....2____ <b>AAE 517</b> (Detailed Des Flight Veh).. 2____ <b>AAE Technical Elective</b> ..... 3____

Attachment #3: Proposed BSAAE Advising Sheet

The advising sheet for the proposed semester program is shown below:

**BSAAE Proposed Advising Sheet**

Total Cr-Hrs for BSAAE Degree: 128

Autumn (1st Semester)			Spring (2nd Semester)		
Engineering	Engineering Survey	1	Programming	Programming	3
Engineering	Introduction to Engineering I	2	Engineering	Introduction to Engineering II	2
Math	Engineering Calculus I	5	Math	Engineering Calculus II	5
Physics	Physics I	5	Physics	Physics II	5
Chem	Gen Chem for Engineers	4	Gen Ed	Writing level I	3
		Total			Total
		17			18
Autumn (3rd Semester)			Spring (4th Semester)		
AAE 2200	Introduction to Aero I	4	AAE 2201	Introduction to Aero II	4
EE	Electrical Engin	3	AAE 2405	Thermodynamics	3
Math	Math III	3	Math	Math IV	3
ME 2010	Statics	2	ME 2030	Dynamics	3
Gen Ed	Writing level II	3	Gen Ed	Arts	3
		Total			Total
		15			16
Autumn (5th Semester)			Spring (6th Semester)		
AAE 3542	Structures I	3	AAE 3543	Structures II	3
AAE 3536	Fluids I	3	AAE 3570	Fluids II	3
AAE 3520	Controls I	3	AAE 3521	Controls II	3
AAE 3581	Math Methods	3	AAE 3580	Heat transfer	3
Gen Ed	Historical Study	3	Gen Ed	Social Sciences 1	3
		Total			Total
		15			15
Autumn (7th Semester)			Spring (8th Semester)		
AAE 4515/4517	Capstone Design I Aero/Space options	3	AAE 4516/4518	Capstone Design II Aero/Space options	3
AAE 4510	Projects Lab I	2	AAE 4511	Projects Lab II	2
AAE 4550	Propulsion	4	AAE	Technical Elective	3
AAE	Technical Elective	3	Gen Ed	Literature	3
AAE	Technical Elective	3	Gen Ed	Culture & Ideas: Ethics	3
Gen Ed	Social Sciences 2	3			Total
		Total			14
		18			

Attachment #4: Proposed BSAAE Curriculum Map

Course Number	a	b	c	d	e	f	g	h	i	j	k
AAE2200	***	**	*		***	*	*	*	*	*	***
ME2010	***		*		***	*	*	*	*	*	***
AAE2201	***	**	*		***	*	*	*	*	*	***
AAE2405	***		*		***	*	*	*	*	*	***
ME2030	***		*		***	*	*	*	*	*	***
AAE3542	***	*	*		***	*	*	*	*	*	***
AAE3536	***	*	*		***	*	*	*	*	*	***
AAE3520	***	*	*		***	*	*	*	*	*	***
AAE3581	***		*		***	*	*	*	*	*	***
AAE3543	***	*	*		***	*	*	*	*	*	***
AAE3570	***	*	*		***	*	*	*	*	*	***
AAE3560	***	*	*		***	*	*	*	*	*	***
AAE3580	***	*	*		***	*	*	*	*	*	***
AAE4515	***		***	***	***	**	***	***	**	**	***
AAE4517	***		***	***	***	**	***	***	**	**	***
AAE4510	***	***	**	**	***	*	***	*	*	*	***
AAE4550	***		*		***	*	*	*	*	*	***
AAE4516	***		***	***	***	**	***	***	**	**	***
AAE4518	***		***	***	***	**	***	***	**	**	***
AAE4511	***	***	**	**	***	*	***	*	*	*	***

**Attachment #5: BSAAE Transition Worksheet**

The table below indicates the proposed transition worksheet:

Quarter Course Completed	q-cr-hrs	Equiv s-cr-hrs	Substitutes For	Cr-hrs	Excess cr-hrs
Engl 110	5	3.33	Writing Level 1	3	0.33
Second writing	5	3.33	Writing Level 2	3	0.33
GEC	5	3.33	Literature	3	0.33
GEC	5	3.33	Arts	3	0.33
GEC	5	3.33	Historical Study	3	0.33
GEC	5	3.33	Social Science 1	3	0.33
			Social Science 2	3	-3.00
GEC/Ethics	5	3.33	Culture & Ideas: Ethics	3	0.33
Eng 100	1	0.67	Engineering Survey	1	-0.33
Eng 181	3	2.00	Intro to Engineering I	2	0.00
Eng 183	3	2.00	Intro to Engineering II	2	0.00
Math 151 & 152 (5 + 2.5)	7.5	5.00	Engineering Calculus I	5	0.00
Math 152 & 153 (2.5 + 5)	7.5	5.00	Engineering Calculus II	5	0.00
Phys 131 & 132 (5 + 2.5)	7.5	5.00	Physics I	5	0.00
Phys 132 & 133 (2.5 + 5)	7.5	5.00	Physics II	5	0.00
Chem 121	5	3.33	Gen Chem for Engineers	4	-0.67
En Graph 167	4	2.67	Programming	3	-0.33
Math 254	5	3.33	Math III	3	0.33
Math 415	4	2.67	Math IV	3	-0.33
EE 300 & 309 (3+1)	4	2.67	Electrical Circuits (2300)	3	-0.33
ME 410	4	2.67	Applied Mech I (2010)	2	0.67
ME 430	4	2.67	Applied Mech II (2030)	3	-0.33
AAE 200	5	3.33	Intro to Aero I	4	-0.67
AAE 201	5	3.33	Intro to Aero II	4	-0.67
AAE 405	4	2.67	Themrodynamics	3	-0.33
AAE 580 & 570 (4+2)	6	4.00	Heat Transfer	3	1.00
AAE 581	3	2.00	Math Meth	3	-1.00
AAE 542 & 510.01 (4 + 1)	5	3.33	Structures I	3	0.33
AAE 543 & 510.01 (4 + 1)	5	3.33	Structures II	3	0.33
AAE 520	4	2.67	Controls I	3	-0.33
AAE 521	4	2.67	Controls II	3	-0.33
AAE 560 & 570 & 510.02 (4 + 1 + 2)	7	4.67	Fluids I	3	1.67
AAE 570 & 530 & 510.03 (1 + 4 + 2)	7	4.67	Fluids II	3	1.67

AAE 550	4	2.67	Propulsion	4	-1.33
			Projects I	2	-2.00
			Projects II	2	-2.00
AAE 515 & 516 (3 + 1.5)	4.5	3.00	Capstone I	3	0.00
AAE 516 & 517 (1.5 + 2)	3.5	2.33	Capstone II	3	-0.67
AAE technical electives	9	6.00	Technical electives	9	-3.00
AAE 512 & 513 & 514 (1 + 1 + 1)	3	2.00			2.00
MSE 205	3	2.00			2.00
ISE 504	3	2.00			2.00
Program Total	187	124.66		128	-3.34
	0	0	<b>Total Completed cr-hrs</b>		
		125.00	<b>Total Remaining cr-hrs</b>		

# MS in Aeronautical and Astronautical Engineering (AAE) Program Proposal

Primary Contact: Mei Zhuang (Zhuang.15).

## **1. Name of Program**

Aeronautical and Astronautical Engineering.

## **2. Name of Degree**

Master of Science in Aeronautical and Astronautical Engineering (MSAAE).

## **3. Responsible Academic Unit**

Department of Mechanical and Aerospace Engineering.

## **4. Type of Program**

d. Graduate degree program.

## **5. Semester Conversion Designation**

No changes to program goals. No changes other than a translation of credit hour requirements.

## **6. Program Learning Goals**

Not required at this time.

## **7. Proposed Program Requirements**

Core program requirements:

- 30 Total graduate-level credit hours (24 hours taken at OSU)
- At least 10 credit hours of AAE courses at the 6000 level or higher (not including AAE 8880, 8998, or 8999)
- Two 5000 level or higher Math/Statistics and/or Numerical Methods (offered by the unit) courses  
(A total of 4 semester credit hour minimum)
- 2 hours of AAE 8880
- Completion of degree within 6 calendar years

Grade requirement: The graduate cumulative point-hour ratio must be no less than 3.0 on a 4.0 scale. A course grade lower than 2.0 may not be counted toward the total 30 credit hour minimum for program completion.

Thesis option program requirements:

- A minimum of 6 but not more than 8 hours of thesis research (AAE 8999) applied towards the M.S. degree.

- Submission of an approved M.S. Thesis to the Graduate School. A copy of the approved thesis must also be submitted to the department for binding.

Non-Thesis option program requirements:

- A minimum of 2 but not more than 4 hours of independent study (AAE 8998) applied towards the M.S. degree.

In addition, BS/MS AAE proposed requirement is in attachment #1.

### 8. Curriculum Map

Not required at this time.

### 9. Rationale for Program Changes and Description of Changes

No changes are proposed for the Aeronautical and Astronautical MS and BS/MS programs other than a translation of credit hour requirements.

### 10. Input for program changes

N/A

### 11. Credit Hour Changes

	Number of qtr-cr-hrs in current program	Calculated result for 2/3 of current qtr-cr-hrs	Number of sem-cr-hrs required for proposed program
Total cr-hrs required for completion of program	45 (thesis) 45 (non-thesis)	30 (thesis) 30 (non-thesis)	30 (thesis) 30 (non-thesis)
Prerequisite cr-hrs required for admission to program which are not counted toward total hours	0	0	0
Required cr-hrs offered by the unit	36 – 45	24 - 30	24 – 30
Required cr-hrs offered outside of the unit	0 – 9	0 – 6	0 – 6

### 12. Rationale for Significant Change in Credit Hours

Not applicable.

### 13. Transition Policy

No AAE major who began the degree program under quarters will have progress toward graduation impeded by the transition to semesters. Graduation requirements beginning Autumn 2012 will be those in force for AAE majors under semesters; but *every* quarter-credit-hour that would have counted toward the AAE major under the quarter-based AAE program will count (as 2/3 of a semester-credit-hour) toward the requirements for graduation

under the semester-based AAE program. Additional advising support will be provided for AAE majors to assist in planning course schedules for the last year of quarters (2011-2012) and for at least the first year of semesters (2012-2013). If it is determined that the “normal” conditions covered by the AAE graduate course plan (attachment #1) would result in a particular student facing an unavoidable delay in graduation compared to quarters due to the change to semesters—rather than the student’s failure to meet with an advisor to complete the worksheet or to make satisfactory progress through the program—then a revision of specific requirements will be worked out for that student by the advising staff with approval by the AAE Graduate Studies Committee.

The transition policy is based on the following principles:

- The switch to semesters will impede no student’s progress toward graduation.
- All students who graduate under semesters, even during the first semester, will do so by meeting the requirements of the semester program.
- Each semester program requirement may be met either by taking an appropriate semester course (or sequence), or by substituting a substantially equivalent quarter course (or sequence) for the corresponding semester course (or sequence).

**14. *Assessment Practices***

Not required at this time for graduate programs.

**15. *Assessment Plan on File with OAA***

Not required at this time for graduate programs.



Attachment #1:

## Combined BS/MS Program in Aerospace Engineering

### **WHAT IS THE BS/MS PROGRAM?**

The BS/MS program allows exceptional OSU Undergraduate students an opportunity to apply as many as 6 credit semester hours from their undergraduate studies towards a Master of Science (MS) degree.

### **WHO CAN APPLY**

Students who have earned at least **90 total credit hours** in the Aerospace Engineering Department or related engineering disciplines, and have a **3.5 grade-point average** or better in all previous undergraduate courses taken at Ohio State, may apply.

### **WHEN TO APPLY**

Applicants should submit an application and the required supplemental documents to the AAE Graduate Program office no earlier than four quarters before the completion of their BS degree and no later than the **5th Friday of the quarter before they wish to start the BS/MS Program**.

### **HOW THE BS/MS PROGRAM WORKS**

Students can take up to 6 credit semester hours worth of classes that can be counted toward both their BS and MS degree. In order to receive graduate credit the courses must meet the following requirements:

- They must be technical elective courses taken at OSU *after* acceptance into the BS/MS Program. *Technical elective courses that are going to be applied to the MS degree must be approved by the AAE BS/MS Advisor.*
- No 4000-level or lower AAE course may be included.
- AAE 6193 and H4999 cannot be included.
- Other than AAE 5193, up to one 5000-level AAE course may be included.
- Any 6000-level or higher AAE course may be included.

### **HOW TO APPLY**

#### **Step One**

You **MUST** meet with the BS/MS Advisor (currently **Professor Jeffrey Bons, [bons.2@osu.edu](mailto:bons.2@osu.edu)**) to discuss the suitability of the BS/MS program and to get his approval prior to applying.

#### **Step Two**

Apply online at [http://gradadmissions.osu.edu/apply\\_online.htm](http://gradadmissions.osu.edu/apply_online.htm). In the field marked "Specialization, if any" please fill in BS/MS.

#### **Step Three**

Submit the following items to the AAE Graduate Program Office:

- A completed BS/MS Degree Information Sheet (located at the bottom of this page) initialed by the BS/MS Advisor
- A Statement of Purpose (including why you are interested in the BS/MS program)

- Three letters of recommendation (preferably from individuals in academia (i.e. professors) or someone who is familiar with your work, like a manager)
- **OPTIONAL:** A one or two page résumé (Only required if you are interested in pursuing a PhD and would like to be considered for a Fellowship).
- *Applicants must meet all requirements of the MS Program as described in the **AAE Graduate Guide** as well as those listed in the **Graduate School handbook**.*

Students interested in pursuing the BS/MS option can also contact **Nick Breckenridge**, Academic Advisor for the AAE graduate program, at **breckenridge.17@osu.edu** or at **(614) 292-7163**.

#### 16. **BS/MS Program Tips**

- Thesis and Non-Thesis options are available (although the Thesis option is encouraged for BS/MS students)
- Once admitted, BS/MS students are officially part of the AAE Graduate Program and are assessed graduate tuition. The Aerospace Engineering Department will provide a scholarship to pay the difference between graduate and undergraduate tuition for up to 4 undergraduate quarters for students pursuing the **Thesis** option. The BS/MS scholarship will continue until BS graduation and it is only available to AAE undergrads. Students must maintain at least a 3.5GPA in order to receive the scholarship.
- BS/MS students will continue to be eligible for undergraduate scholarships until the completion of their BS degree.
- Upon admission to the BS/MS program students will be eligible for Graduate Associate positions.
- BS/MS students who are considering the pursuit of a PhD, apply by the January 1st deadline, and submit GRE scores, are eligible for multiple-year Graduate School Fellowships. If a Fellowship is awarded, then it will not be in effect until the student starts to pursue a PhD. **Note: BS/MS students for whom MS is the final degree are not eligible for Graduate School Fellowships**
- Typical GRE scores for Fellowship consideration are:
  - A combined average of the 75<sup>th</sup> percentile on the Verbal and Quantitative sections. That does not mean you must score within the 75<sup>th</sup> percentile on both tests individually, rather that the average of the two tests must be within the 75<sup>th</sup> percentile. For example, a score that falls within the 95<sup>th</sup> percentile in the Quantitative section and the 60<sup>th</sup> percentile in the Verbal section is well within the required average for a Fellowship.
  - A typical score on the Writing section is at least 4.0.
- The BS/MS program, while distinct from the **BS Honors** program, targets the same students. These programs are **NOT** mutually exclusive. As a matter of fact, participating in both the BS Honors and BS/MS program is **STRONGLY** encouraged as the programs are highly synergistic and maximize the benefits to the participants.
- The selection of a **Graduate Faculty Advisor**, while not technically required to apply, is highly recommended and should be a top priority prior to or shortly after admission into the program. The role of the graduate advisor is **much** stronger than the role at the undergraduate level. The Graduate Advisor will aid you in class selection, choosing a research topic, coordinating your thesis, one-on-one advising, and may provide financial

support (often times in the form of GRA). Typically students are encouraged to talk with different Faculty members during their first full quarter in the MS program. This allows the student to get an idea for what research the Faculty member is doing and it gives the Faculty member a chance to get to know the student as well. It is important to recognize your own interests and try to find a Faculty member that shares some, if not all, of your interests, as it will provide you with a better Graduate experience overall.

## **17. *BS/MS Financial Aid Options***

### **BS/MS Scholarship**

Upon admittance into the BS/MS Program, the AAE department will pay the difference between graduate and undergraduate tuition for up to four undergraduate quarters for Aerospace Engineering undergraduate students who select the thesis option.

### **Fellowships**

BS/MS applicants who commit to pursuing a PhD, apply by the January 1st deadline, and submit GRE scores are eligible for Graduate School Fellowships starting in the first year of their PhD degree. Note: BS/MS students for whom MS is the final degree are not eligible for Graduate School Fellowships.

### **Scholarships**

BS/MS students will continue to be eligible for undergraduate scholarships through BS graduation.

### **Graduate Assistantships**

Upon admission to the BS/MS program, students become eligible for graduate assistantships.

## **PhD in Aeronautical and Astronautical Engineering (AAE) Program Proposal**

Primary Contact: Mei Zhuang (zhuang.15).

### **1. Name of Program**

Aeronautical and Astronautical Engineering.

### **2. Name of Degree**

Doctor of Philosophy in Aeronautical and Astronautical Engineering (PhD AAE).

### **3. Responsible Academic Unit**

Department of Mechanical and Aerospace Engineering.

### **4. Type of Program**

d. Graduate degree program.

### **5. Semester Conversion Designation**

No changes to program goals. No changes other than a translation of credit hour requirements.

### **6. Program Learning Goals**

Not required at this time.

### **7. Proposed Program Requirements**

Within the first semester of the initiation of study the student must form a four-member advisory committee, chaired by the student's advisor. Three of the members must be from the Department of Aerospace Engineering. The student and the advisor must formulate, within the first semester of the initiation of study, a mutually agreed upon course plan, subject to the approval of the advisory committee. Changes to the plan should be mutually agreed upon by both the student and the advisor with the approval of the advisory committee.

Course plan must satisfy the minimum requirements listed below and include completion of 80 graduate credit hours beyond the B.S. degree. Common or equivalent requirements to a M.S. degree, up to 30 credit hours, may be applied towards the Ph.D. degree at the discretion of the student's advisory committee.

Core program requirements:

- 80 Total graduate-level credit hours (50 hours taken at OSU)
- A minimum of 24 hours of advanced courses at the 6000-8000 level, at least 16 credit hours of which must be AAE courses (not including AAE 8880, 8998, or 8999)
- Two 6000 level or higher Math/Statistics and/or Numerical Methods (offered by the unit) courses  
(A total of 4 semester credit hour minimum)
- 4 hours of AAE 8880

- A minimum of 30 hours of AAE 8999 for dissertation research
- Students admitted with a M.S. earned at another institution (or a different department within OSU) may petition to have “equivalent” Aero courses from their MS degree counted toward the 16 AAE credit-hour requirement. This written petition must be approved by their advisor and submitted to the Graduate Studies Committee with their proposed plan of study, along with copies of the M.S. degree transcript and syllabi for relevant coursework. A determination will be made based on the course content and the student’s performance in the course.
- Completion of degree within 5 calendar years from completion of the Ph.D. Candidacy Examination

Grade requirement:

- The graduate cumulative point-hour ratio must be no less than 3.0 on a 4.0 scale.
- PhD candidates must achieve a minimum grade of “C” in each course to receive credit for that course.

Residency requirement:

The residency requirement will be aligned with the rules set forth by the Graduate School

PhD Candidacy Examination:

- The Ph.D. Candidacy Examination is administered by the student's advisory committee and a Graduate School Representative, and consists of a series of written examination and an oral examination. It is generally taken after the student satisfies most of the course requirements. The objective of this examination is to test the student's knowledge of the major field of study, capacity to undertake independent research and the ability to think and express ideas clearly. No student may take the Candidacy Examination more than twice.
- The written portion of the examination consists of three separate examinations given by members of the advisory committee: An eight hour examination by the student's advisor, and two four hour examinations given by two other members of the student's advisory committee. The format of the examinations is determined by the faculty members administering them.
- The oral portion of the examination is chaired by the student's advisor. Satisfactory performance requires a unanimous vote of the committee members and the Graduate School Representative.
- All examinations, written and oral, must be taken within a 45-day period. It is required that the student take the Ph.D. Candidacy Examination within two years if entering the Ph.D. program with a M.S. degree or within three years if the student is entering the Ph.D. program with a B.S. degree.
- For those students taking the Ph.D. Candidacy Examination a second time, all portions of the exam must be completed no later than two semesters before graduation.

Final Oral Examination:

The oral examination will be administered in accordance with the rules set forth by the Graduate School

**8. Curriculum Map**

Not required at this time.

**9. Rationale for Program Changes and Description of Changes**

No changes are proposed for the Aeronautical and Astronautical PhD program other than a translation of credit hour requirements.

**10. Input for program changes**

N/A

**11. Credit Hour Changes**

	Number of qtr-cr-hrs in current program	Calculated result for 2/3 of current qtr-cr-hrs	Number of sem-cr-hrs required for proposed program
Total cr-hrs required for completion of program	120	80	80
Prerequisite cr-hrs required for admission to program which are not counted toward total hours	0	0	0
Required cr-hrs offered by the unit	111 to 120	74 to 80	74 to 80
Required cr-hrs offered outside of the unit	0 to 9	0 to 6	0 to 6

**12. Rationale for Significant Change in Credit Hours**

Not applicable.

**13. Transition Policy**

No AAE major who began the degree program under quarters will have progress toward graduation impeded by the transition to semesters. Graduation requirements beginning Autumn 2012 will be those in force for AAE majors under semesters; but every quarter-credit-hour that would have counted toward the AAE major under the quarter-based AAE program will count (as 2/3 of a semester-credit-hour) toward the requirements for graduation under the semester-based AAE program. Additional advising support will be provided for AAE majors to assist in planning course schedules for the last year of quarters (2011-2012) and for at least the first year of semesters (2012-2013). If it is determined that the “normal” conditions covered by the AAE graduate course plan (attachment #1) would result in a particular student facing an unavoidable delay in graduation compared to quarters due to the

change to semesters—rather than the student’s failure to meet with an advisor to complete the worksheet or to make satisfactory progress through the program—then a revision of specific requirements will be worked out for that student by the advising staff with approval by the AAE Graduate Studies Committee.

The transition policy is based on the following principles:

- The switch to semesters will impede no student’s progress toward graduation.
- All students who graduate under semesters, even during the first semester, will do so by meeting the requirements of the semester program.
- Each semester program requirement may be met either by taking an appropriate semester course (or sequence), or by substituting a substantially equivalent quarter course (or sequence) for the corresponding semester course (or sequence).

**14. *Assessment Practices***

Not required at this time for graduate programs.

**15. *Assessment Plan on File with OAA***

Not required at this time for graduate programs.

## List of AAE Courses

AEROENG 2200	AEROENG	Introduction to Aerospace Engineering I	4.0	Proposed	<a href="#">Show</a> <a href="#">Edit</a> <a href="#">Delete</a>
AEROENG 2201	AEROENG	Introduction to Aerospace Engineering II	4.0	Proposed	<a href="#">Show</a> <a href="#">Edit</a> <a href="#">Delete</a>
AEROENG 2405	AEROENG	Thermodynamics	3.0	Proposed	<a href="#">Show</a> <a href="#">Edit</a> <a href="#">Delete</a>
AEROENG 3520	AEROENG	Flight Vehicle Dynamics	3.0	Proposed	<a href="#">Show</a> <a href="#">Edit</a> <a href="#">Delete</a>
AEROENG 3521	AEROENG	Linear Systems Engineering	3.0	Proposed	<a href="#">Show</a> <a href="#">Edit</a> <a href="#">Delete</a>
AEROENG 3536	AEROENG	Fundamentals of Aerodynamics	3.0	Proposed	<a href="#">Show</a> <a href="#">Edit</a> <a href="#">Delete</a>
AEROENG 3542	AEROENG	Flight Vehicle Structures I	3.0	Proposed	<a href="#">Show</a> <a href="#">Edit</a> <a href="#">Delete</a>
AEROENG 3543	AEROENG	Flight Vehicle Structures II	3.0	Proposed	<a href="#">Show</a> <a href="#">Edit</a> <a href="#">Delete</a>
AEROENG 3570	AEROENG	One Dimensional Gas Dynamics	3.0	Proposed	<a href="#">Show</a> <a href="#">Edit</a> <a href="#">Delete</a>
AEROENG 3580	AEROENG	Viscous Flow and Heat Transfer	3.0	Proposed	<a href="#">Show</a> <a href="#">Edit</a> <a href="#">Delete</a>
AEROENG 3581	AEROENG	Numerical Methods in Aerospace Engineering	3.0	Proposed	<a href="#">Show</a> <a href="#">Edit</a> <a href="#">Delete</a>
AEROENG 4193	AEROENG	Individual Studies in Aerospace Engineering	1.0 - 7.0	Proposed	<a href="#">Show</a> <a href="#">Edit</a> <a href="#">Delete</a>
AEROENG 4194	AEROENG	Group Studies in Aerospace Engineering	1.0 - 3.0	Proposed	<a href="#">Show</a> <a href="#">Edit</a> <a href="#">Delete</a>
AEROENG 4510	AEROENG	Projects I	2.0	Proposed	<a href="#">Show</a> <a href="#">Edit</a> <a href="#">Delete</a>
AEROENG 4511	AEROENG	Projects II	2.0	Proposed	<a href="#">Show</a> <a href="#">Edit</a> <a href="#">Delete</a>
AEROENG 4515	AEROENG	Preliminary Design of Atmospheric Flight Vehicles	3.0	Proposed	<a href="#">Show</a> <a href="#">Edit</a> <a href="#">Delete</a>
AEROENG 4516	AEROENG	Detailed Design of Atmospheric Flight Vehicles	3.0	Proposed	<a href="#">Show</a> <a href="#">Edit</a> <a href="#">Delete</a>
AEROENG 4517	AEROENG	DESIGN OF SPACE VEHICLES AND SYSTEMS I	3.0	Proposed	<a href="#">Show</a> <a href="#">Edit</a> <a href="#">Delete</a>
AEROENG 4518	AEROENG	DESIGN OF SPACE VEHICLES AND SYSTEMS II	3.0	Proposed	<a href="#">Show</a> <a href="#">Edit</a> <a href="#">Delete</a>
AEROENG 4550	AEROENG	Principles of Flight Vehicle Propulsion	4.0	Proposed	<a href="#">Show</a> <a href="#">Edit</a> <a href="#">Delete</a>
AEROENG 4938	AEROENG	Wind Energy	3.0	Proposed	<a href="#">Show</a> <a href="#">Edit</a> <a href="#">Delete</a>
AEROENG 4998	AEROENG	Aerospace Engineering Research	1.0 - 3.0	Proposed	<a href="#">Show</a> <a href="#">Edit</a> <a href="#">Delete</a>
AEROENG 4999	AEROENG	Aerospace Engineering Thesis Research	1.0 - 3.0	Proposed	<a href="#">Show</a> <a href="#">Edit</a> <a href="#">Delete</a>
AEROENG 4999H	AEROENG	Aerospace Engineering Honors Thesis Research	1.0 - 3.0	Proposed	<a href="#">Show</a> <a href="#">Edit</a> <a href="#">Delete</a>



AEROENG 5610	AEROENG Helicopter Aerodynamics	3.0	Proposed	<a href="#">Show</a> <a href="#">Edit</a> <a href="#">Delete</a>
AEROENG 5612	AEROENG Aircraft Performance and Flight Test Engineering	3.0	Proposed	<a href="#">Show</a> <a href="#">Edit</a> <a href="#">Delete</a>
AEROENG 5615	AEROENG Introduction to Computational Aerodynamics	3.0	Proposed	<a href="#">Show</a> <a href="#">Edit</a> <a href="#">Delete</a>
AEROENG 5620	AEROENG Aircraft Control Systems Analysis and Design	3.0	Proposed	<a href="#">Show</a> <a href="#">Edit</a> <a href="#">Delete</a>
AEROENG 5621	AEROENG Spacecraft Control Systems Analysis and Design	3.0	Proposed	<a href="#">Show</a> <a href="#">Edit</a> <a href="#">Delete</a>
AEROENG 5626	AEROENG Orbital Mechanics for Engineers	3.0	Proposed	<a href="#">Show</a> <a href="#">Edit</a> <a href="#">Delete</a>
AEROENG 5645	AEROENG Introduction to Structural Dynamics and Aeroelasticity of Aerospace Vehicles	4.0	Proposed	<a href="#">Show</a> <a href="#">Edit</a> <a href="#">Delete</a>
AEROENG 5751	AEROENG Advanced Air-Breathing Propulsion	3.0	Proposed	<a href="#">Show</a> <a href="#">Edit</a> <a href="#">Delete</a>
AEROENG 5752	AEROENG Advanced Rocket Propulsion	3.0	Proposed	<a href="#">Show</a> <a href="#">Edit</a> <a href="#">Delete</a>
AEROENG 5771	AEROENG Viscous Fluid Flow: Laminar and Transitional	3.0	Proposed	<a href="#">Show</a> <a href="#">Edit</a> <a href="#">Delete</a>
AEROENG 6193	AEROENG Individual Studies in Aerospace Engineering	1.0 - 7.0	Proposed	<a href="#">Show</a> <a href="#">Edit</a> <a href="#">Delete</a>
AEROENG 6194	AEROENG Group Studies in Aerospace Engineering	1.0 - 3.0	Proposed	<a href="#">Show</a> <a href="#">Edit</a> <a href="#">Delete</a>
AEROENG 6860	AEROENG Experimental Fluid Mechanics	3.0	Proposed	<a href="#">Show</a> <a href="#">Edit</a> <a href="#">Delete</a>
AEROENG 7720	AEROENG Advanced Stability and Control of Flight Vehicles	3.0	Proposed	<a href="#">Show</a> <a href="#">Edit</a> <a href="#">Delete</a>
AEROENG 7774	AEROENG Aeroacoustics	3.0	Proposed	<a href="#">Show</a> <a href="#">Edit</a> <a href="#">Delete</a>
AEROENG 7775	AEROENG Hypersonic Flow	3.0	Proposed	<a href="#">Show</a> <a href="#">Edit</a> <a href="#">Delete</a>
AEROENG 7842	AEROENG Advanced Structures for Flight Vehicles	3.0	Proposed	<a href="#">Show</a> <a href="#">Edit</a> <a href="#">Delete</a>
AEROENG 7844	AEROENG Optimal Design of Aerospace Structures	3.0	Proposed	<a href="#">Show</a> <a href="#">Edit</a> <a href="#">Delete</a>
AEROENG 7862	AEROENG Internal FLOws in Turbomachinery	3.0	Proposed	<a href="#">Show</a> <a href="#">Edit</a> <a href="#">Delete</a>
AEROENG 7875	AEROENG Introduction to Turbulence	3.0	Proposed	<a href="#">Show</a> <a href="#">Edit</a> <a href="#">Delete</a>

AEROENG 8193	AEROENG	Individual Studies in Aerospace Engineering	1.0 - 7.0	Proposed	<a href="#">Show</a> <a href="#">Edit</a> <a href="#">Delete</a>
AEROENG 8194	AEROENG	Group Studies Aerospace Engineering	1.0 - 3.0	Proposed	<a href="#">Show</a> <a href="#">Edit</a> <a href="#">Delete</a>
AEROENG 8802	AEROENG	Advanced Mathematical Methods in Engineering	3.0	Proposed	<a href="#">Show</a> <a href="#">Edit</a> <a href="#">Delete</a>
AEROENG 8820	AEROENG	Robust Multivariable Control with Applications	3.0	Proposed	<a href="#">Show</a> <a href="#">Edit</a> <a href="#">Delete</a>
AEROENG 8866	AEROENG	Hydrodynamic Stability of Fluid Motions	3.0	Proposed	<a href="#">Show</a> <a href="#">Edit</a> <a href="#">Delete</a>
AEROENG 8873	AEROENG	Computational Fluid Dynamics	3.0	Proposed	<a href="#">Show</a> <a href="#">Edit</a> <a href="#">Delete</a>
AEROENG 8889	AEROENG	Advanced Topics in Aerospace Engineering	1.0 - 3.0	Proposed	<a href="#">Show</a> <a href="#">Edit</a> <a href="#">Delete</a>
AEROENG 8999	AEROENG	Aerospace Engineering Research for Dissertation or Thesis	1.0 - 12.0	Proposed	<a href="#">Show</a> <a href="#">Edit</a> <a href="#">Delete</a>