USU Mechanical & Aerospace Engineering Department

Checklist for Aerospace Engineering PhD Degree Beyond the BS Degree

Name_____ Student A#_____

1. **Choose courses satisfying requirements below, and add to checklist.** Course descriptions and schedules on MAE website.
2. Student reviews checklist with major professor, changes are made if needed, and student and professor sign.
3. Student and major professor discuss which faculty should serve on the supervisory committee.
4. Approved checklist submitted to MAE Graduate Academic Advisor before end of third semester.

Credit Requirements (72 minimum)

☐	**18 credits Aerospace Engineering Core courses** (if MAE 5500 and/or 5560 completed for a Bachelor's degree, those credits may be replaced with either core or tech elective credits here.)					
☐	**6 credits Advanced Math** Supervisory committee approval if not on approved Math list (page 2.)					
☐	**12 credits Aerospace Electives**					
☐	**MS-C option:** 3 additional courses (at least 2 must be Core)					
☐	**36 credits MAE 7970 Dissertation Research (List credits below.)**					

List schedule of courses/credits including courses for MS option, if pursuing.

Course	Cr	Semester	Gr	Course	Cr	Semester	Gr	Course	Cr	Semester	Gr
USU 6900 RCR	0										

0

For eligible students, tuition awards are for approved Program of Study credits, and limited to 9 credits each fall and spring semesters, and for summer, if needed, up to 6 coursework credits or 3 research credits if doing final dissertation defense.

Other Requirements

☐	**PhD Qualifying Exam passed by end of third semester.** List subject areas and dates in table on second page.	
☐	**MS-C option: Plan C program of study approved by PhD committee, total of 81 credits minimum.**	
☐	**Completion of USU 6900 and Research Scholars Certificate Program.**	
☐	**Oral Research Presentation – Dissertation Proposal Defense.**	**Date:**
☐	**Submission of Application for Candidacy and Dissertation Proposal.**	**Date:**
☐	**Submit paper for publication in refereed journal prior to scheduling final defense** (related to dissertation and student first author.)	
	Title:	**Journal:** / **Date Submitted:**
☐	**Successful dissertation defense. Submit dissertation to committee 4 weeks prior to scheduled defense.**	

List faculty who have agreed to serve on your supervisory committee.

Major Professor	Committee Members		Outside Member

* Competitively graded 6930 or 7930 courses are allowed. They have an assigned room and class schedule; enrollment is open to all students who have completed the proper prerequisites; a course syllabus is given to students; and assignments and tests are competitively graded.

**If research requires interdisciplinary work, MAE 7970 Dissertation Research credits may be replaced by a 3000-level different department course. Full supervisory committee approval required before registering for it. Additional 3000-level courses, approved by the committee, may be added but not replace other requirements. (Policy

PhD Qualifying Exam

The Ph.D. qualifying examination **consists of three subject area exams**: a **required mathematics** area exam, and **two subject area exams chosen by the student** from the list below. All exams are based on undergraduate-level coursework.

- **All three subject area exams must be taken on the first attempt,** and a **maximum of two attempts are allowed** to pass the exams. All subject areas not passed on the first attempt must be retaken on the second attempt. For summer and fall admits, the first attempt will be no later than the week before the first spring semester, and for spring admits it will be no later than the week before the first fall semester.
- Passing grades must be obtained on each of the three subject area exams. **A minimum grade of 80/100 is required to pass a subject area exam.**
- The three subject area exams **must be passed before completing three semesters** (not counting summer) as a matriculated, provisionally matriculated, or matriculated-probationary Ph.D. student.
- The subject area exams are **given the week before each fall and spring semesters**, as necessary. Register by April 1st for the fall exam, and by October 1st for the spring exam. To register, email the MAE Graduate Academic Advisor the subject area exams you will take.
- The **time limit on each subject area exam is three hours**, and a maximum of two subject area exams may be taken in any one day.
- The MAE Graduate Academic Advisor is the point of contact for students' questions about the exams.

Subject Area	Based on USU Course	1st Date Taken	Pass or Fail	2nd Date Taken	Pass or Fail
Mathematics (required)	MATH 2210/2250				
Numerical Methods	MAE 3210				
Fluid Mechanics	MAE 3420				
Heat Transfer	MAE 3440				
Solid Mechanics	MAE 3040				
Dynamics	ENGR 2030				
Aeronautics	MAE 5500/5510				
Astronautics	MAE 5560				

Approved Mathematics Courses

Fall Semester
MATH 5410 Methods of Applied Mathematics
MATH 5760 Stochastic Processes
MATH 6410 Ordinary Differential Equations I
ECE 6010 Stochastic Processes in Electronic Systems

Spring Semester
MATH 5270 Complex Variables
MATH 5420 Partial Differential Equations
MATH 5460 Intro to Theory/Application of Nonlinear
MATH 6270 Complex Variables
MATH 6420 Partial Differential Equations I

Spring Semester continued
MATH 6440 Ordinary Differential Equations II
MATH 6450 Partial Differential Equations II
MATH 6470 Advanced Asymptotic Methods
MATH 6610 Matrix Computations
MATH 6620 Numerical Analysis
MATH 6640 Optimization
ECE 6030 Math Methods for Signals and Systems
STAT 5200 Design of Experiments

Summer Semester
MAE 7560 Optimal Estimation for Aerospace Systems

Semester Graduating: _____

Applicant: _____
Signature Date

Dept. Official: _____
Signature Date

Major Professor: _____
Signature Date

Aerospace Engineering Approved Course List

Aerospace Engineering Core

Fall Semester

MAE 5500 Aerodynamics (MAE 3420)
MAE 5560 Dynamics of Space Flight (MAE 3320)
MAE 6340 Spacecraft Attitude Control Theory (MAE 5310)
MAE 6500 Potential Flow* (MAE 5500)
MAE 6510 Aircraft Dynamics & Flight Simulation (MAE 5510)
MAE 6530 Advanced Propulsion (MAE 5540)
MAE 6540 Advanced Astrodynamics* (MAE 5560)
MAE 7540 Adv Astro Techniques/Applications* (MAE 5560)

Spring Semester

MAE 6345 Spacecraft Attitude Control Application (MAE 6340)
MAE 6560 Spacecraft Navigation* (MAE 5310)
MAE 7340 Advanced Aerospace Controls (MAE 6320)

Summer Semester

MAE 6570 Optimal Space Guidance* (MATH 2210, 2250)
MAE 7560 Optimal Estimation/Aerospace* (MAE 5310)
MAE 7570 Monte Carlo/Linear Covariance* (MAE 6560)

Technical Electives

Fall Semester

MAE 5310 Dynamic Systems and Controls (MAE 3340)
MAE 5420 Compressible Fluid Flow (MAE 2300)
MAE 6180 Dynamics & Vibrations (MAE 5300 or 6130)
MAE 6410 Fluid Dynamics (MAE 3420 or CEE 3500)
MAE 6320 Linear Multivariable Control (MAE 5310)
ECE 5230 Space Systems Engineering (MATH 2270, 2280)
ECE 6240 Space Environment Engineering (ECE 5230)
MAE 7360 Optimal and Robust Control (MAE 6320)

Spring Semester

MAE 5440 Computational Fluid Dynamics (MAE 3420, 3440)
MAE 5510 Dynamics of Atmospheric Flight (MAE 5500)
MAE 5540 Propulsion Systems (MAE 5420)
MAE 6440 Advanced CFD (MAE 5440, 6410)
MAE 6490 Turbulence* (MAE 6410)
MAE 6550 Advanced Structural Analysis (MAE 6040)
MAE 7330 Nonlinear and Adaptive Control (MAE 6320)

All Semesters (Fall, Spring, and Summer) MAE 5930, 6930, 7930 Special Topics (must be Aero focused)

* Not offered every year; check schedule or ask instructor.

Updated 4/19/2016