Aerospace Engineering, M.S.A.E.

Curriculum in Master of Science in Aerospace Engineering

A candidate for the M.S. degree in aerospace engineering must comply with the rules and regulations as outlined in the WVU Graduate Catalog and the specific requirements of the Statler College and the Mechanical and Aerospace Engineering Department.

Program Requirements

All M.S. degree candidates are required to perform research (except those pursuing the Coursework Option) and follow a planned program of study. The student's research advisor, in conjunction with the student's Advising and Examining Committee (AEC) will be responsible for determining the plan of study appropriate to the student's needs. The underlying principle of the planned program is to provide the students with the necessary support to complete their degree and prepare them for their career.

Curriculum Requirements

Code	Title	Hours
A minimum cumulative GPA of 3.0 is required in all courses.		
A minimum of 60% of courses must be from 500 level or above.		
Course Requirements *		
Plan of Study		
Thesis Option (30 credit hours)		
Core Area Courses (6 credit hours)		
Mathematics Requirements (6 credit hours)		
Additional Courses (12 credit hours) - Any BIOM, BMEG, CE, CHE, CHEM, CPE, CS, EE, IENG, MAE, MATH, MINE, PNGE, PHYS, SENG, EXPH 583, or STAT courses 400-795, as approved by the student's AEC		
MAE 697	Research (6 credit hours)	
Final Oral or Written Examination		
Thesis		
Problem Report Option (30 credit hours)		
Core Area Courses (6 credit hours)		
Mathematics Requirements (6 credit hours)		
Additional Courses (15 credit hours) - Any BIOM, BMEG, CE, CHE, CHEM, CPE, CS, EE, IENG, MAE, MATH, MINE, PNGE, PHYS, SENG, EXPH 583, or STAT courses 400-795, as approved by the student's AEC		
MAE 672	Project Report (3 credit hours)	
Final Oral or Written Examination		
Formal Written Report or Professional Report/Paper		
Coursework Option (30 credit hours)		
Core Area Courses (15 credit hours)		
Mathematics Requirements (6 credit hours)		
Additional Courses (6 credit hours) - Any BIOM, BMEG, CE, CHE, CHEM, CPE, CS, EE, IENG, MAE, MATH, MINE, PNGE, PHYS, SENG, EXPH 583, or STAT courses 400-795, as approved by the student's AEC		
MAE 671	Graduate Capstone Project (3 credit hours)	
Final Oral or Written Examination		
Total Hours		**30**

MATHEMATICS REQUIREMENTS FOR ALL OPTIONS (6 CREDIT HOURS)

Code	Title	Hours
Select two of the following (at least one course with MATH prefix):		
MATH 420	Numerical Analysis 1	
MATH 441	Applied Linear Algebra	
MATH 456	Complex Variables	
MATH 521	Numerical Analysis	
MATH 522	Numerical Solution of PDE	
MATH 541	Modern Algebra 1	

MATH 543	Linear Algebra
MATH 545	Number Theory 1
MATH 551	Real Variables 1
MATH 555	Complex Variables 1
MATH 560	Introduction to Dynamical Systems and Applications
MATH 563	Mathematical Modeling
MATH 564	Intermediate Differential Equations
MATH 566	Intermediate Partial Differential Equations
MATH 567	Advanced Calculus 1
MATH 568	Advanced Calculus
MATH 573	Graph Theory
STAT 513	Design of Experiments
STAT 545	Applied Regression Analysis
STAT 561	Theory of Probability and Statistics 1
STAT 562	Theory of Probability and Statistics 2
MAE 515	Analytical Methods in Engineering
MAE 623	Conduction Heat Transfer
MAE 633	Computational Fluid Dynamics
MAE 640	Continuum Mechanics
MAE 645	Energy Methods in Applied Mechanics
CHE 531	Mathematical Methods in Chemical Engineering
EE 463	Digital Signal Processing Fundamentals
EE 465	Introduction to Digital Image Processing
EE 515	Linear Control Systems
EE 517	Optimal Control
IENG 518	Technology Forecasting
IENG 553	Applied Linear Programming
PHYS 461	Thermodynamics and Statistical Mechanics
PHYS 611	Introduction to Mathematical Physics

CORE AREA COURSES FOR THESIS OR PROBLEM REPORT OPTIONS (6 CREDIT HOURS)

Code	Title	Hours
Select two courses in a single core area from the following:		
Area A: Fluid Mechanics and Aerodynamics (FMA)		
MAE 532	Dynamics of Viscous Fluids	
MAE 624	Convection Heat Transfer	
or MAE 636	Fundamentals of Turbulent Flow	
Area B: Thermal Sciences and Systems (TSS)		
MAE 521	Advanced Thermodynamics 1	
MAE 532	Dynamics of Viscous Fluids	
MAE 624	Convection Heat Transfer	
Area C: Dynamics and Controls (D&C)		
MAE 642	Intermediate Dynamics	
or MAE 653	Advanced Vibrations	
MAE 660	Feedback Control in Mechanical Engineering	
Area D: Solid Mechanics and Design (SMD)		
MAE 543	Advanced Mechanics of Materials	
or MAE 642	Intermediate Dynamics	
MAE 640	Continuum Mechanics	
or MAE 653	Advanced Vibrations	
Area E: Materials Science (MS)		
MSEN 580	Crystallography and Crystals	

MSEN 583	Thermodynamics and Kinetics of Materials
MSEN 649	Microscopy of Materials

CORE AREA COURSES FOR COURSEWORK OPTION (15 CREDIT HOURS)

Code	Title	Hours
Select from the following:		
MAE 521	Advanced Thermodynamics 1	
MAE 532	Dynamics of Viscous Fluids	
MAE 543	Advanced Mechanics of Materials	
MAE 653	Advanced Vibrations	
MAE 660	Feedback Control in Mechanical Engineering	
MSEN 580	Crystallography and Crystals	

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Students who do not hold a baccalaureate degree in aerospace engineering will be required to take a set of undergraduate aerospace engineering courses above and beyond the minimum coursework requirements in order to overcome deficiencies in the aerospace engineering area.

Final Examination

M.S. students following the thesis or problem report option must prepare a written research proposal. The proposal must be approved by the student's AEC at least one semester prior to the final oral examination.

All students, regardless of option, are required to pass a final oral or written examination, administered by their AEC, covering the thesis or problem report and/or related course material.

The student's request for the comprehensive exam for students in the Coursework Only degree option must be filed at least four weeks in advance of the desired date of the exam. The comprehensive exam for students in the Coursework Only degree option must be passed at least 3 weeks before graduation.

Accelerated Program

- BSAE Aerospace Engineering and MSAE Aerospace Engineering (p. 3)

Accelerated Bachelor's/Masters in Aerospace Engineering

Students must fulfill all degree requirements for the B.S.A.E. in Aerospace Engineering and all the requirements of the M.S.A.E. in Aerospace Engineering. Students must also meet all the requirements of the ABM.

ABM REQUIREMENTS

Code	Title	Hours
Undergraduate Coursework		117
Shared Bachelor's/Master's Coursework		9
Graduate Coursework		21
Total Hours		147

SHARED COURSEWORK CURRICULUM REQUIREMENTS

Code	Title	Hours
Courses completed must be at the 400 or 500 level.		
See BSAE and MSAE for list of elective course options.		
Courses:		
Technical Elective		3
Technical Elective		3
Technical Elective		3
Total Hours		9

SUGGESTED PLAN OF STUDY

Its is important for students to take courses in the order specified as much as possible; all prerequisites and concurrent requirements must be observed. A typical ABM B.S.A.E. & M.S.A.E. degree program completes degree requirements in five year is as shown.

First Year

Fall	Hours	Spring	Hours
CHEM 115 & 115L	4	MAE 102	3
ENGL 101 (GEF 1)	3	MATH 156 (GEF 8)	4
ENGR 101	2	PHYS 111 & 111L (GEF 8)	4
ENGR 191	1	GEF Elective 6	3
MATH 155 (GEF 3)	4	GEF Elective 7	3
GEF Elective 5	3		
	17		17

Second Year

Fall	Hours	Spring	Hours
MAE 202	1	ENGL 102	3
MAE 212L	1	MAE 242	3
MAE 215	3	MAE 243	3
MAE 216L	1	MAE 244L	1
MAE 241	3	MATH 261	4
MATH 251 (GEF 8)	4		
PHYS 112 & 112L	4		
	17		14

Third Year

Fall	Hours	Spring	Hours
EE 221 & 221L	4	ECON 201	3
MAE 316	3	MAE 336	3
MAE 320	3	MAE 345	3
MAE 335	3	MAE 476	3
MAE 353	3	AOE Course	3
	16		15

Fourth Year

Fall	Hours	Spring	Hours
MAE 434 & 434L	3	MAE 423	3
MAE 456 & 456L	3	MAE 460	3
Technical Electives*	3	AOE Course	3
AOE Courses	6	Technical Electives*	6
	15		15

Fifth Year

Fall	Hours	Spring	Hours
MAE 697	3	MAE 697	3
Core Area Course	3	Core Area Course	3
Mathematics Requirement Course	3	Mathematics Requirement Course	3
Additional Courses	3		
	12		9

Total credit hours: 147

*****
Indicates that this course will be shared with the MS requirements

+
See BSAE for list of area of emphasis courses.

++
See MSAE for list of core area courses and mathematics requirement courses.

Major Learning Outcomes

AEROSPACE ENGINEERING

The MAE Department is committed to deliver high quality education and research experience to all graduate students in order to enable them to achieve success in their careers, though the following Learning Goals:

- Expertise, depth and breadth in a chosen field of aerospace engineering.
- Capacity to engage in original research, advanced technological discovery and innovation to advance the frontiers of knowledge in the science of the aerospace engineering discipline.
- Capacity of effective high level communication to document, disseminate and transfer knowledge of the science of the aerospace engineering discipline in educational, research or applied workplace settings.
- Appreciation and understanding of the role of the science of the aerospace engineering discipline in a global and societal context.