## Contents

1. OVERVIEW ................................................................................................................................. 2
2. ADMISSIONS POLICY .................................................................................................................. 2
2.a. ADMISSION REQUIREMENTS .................................................................................................. 3
2.b. APPLICATION PROCESS .......................................................................................................... 3
2.c. APPLICATION STATUS ............................................................................................................. 3
3. FINANCIAL SUPPORT POLICY ................................................................................................... 3
4. GRADUATE PROGRAMS ................................................................................................................ 4
4.a. GRADUATE COURSES ............................................................................................................. 4
4.b. DOCTOR OF PHILOSOPHY (PhD) .............................................................................................. 4
   4.b.1 Selection of a PhD Advisor .................................................................................................. 5
   4.b.2 PhD Qualifying Criteria ....................................................................................................... 5
   4.b.3 PhD Program Committee ..................................................................................................... 6
   4.b.4 PhD Plan of Study (iPOS) ................................................................................................... 7
   4.b.5 PhD Comprehensive Examination ....................................................................................... 7
   4.b.6 PhD in Mechanical or Aerospace Engineering with a Concentration in Engineering Education .......... 7
   4.b.7 PhD Candidacy ................................................................................................................... 8
   4.b.8 PhD Final Oral Examination .............................................................................................. 8
4.c. MASTERS IN PASSING (MIP) ..................................................................................................... 8
5. MILESTONES AND TIMELINE ..................................................................................................... 9
5.a. PHD DEGREE ................................................................................................................................ 9
6. SATISFACTORY STANDING .......................................................................................................... 9
7. GRADUATE STUDENT ADVISING ............................................................................................... 9
8. ADMISSION TO PHD PROGRAM WITHOUT MS OR MSE ......................................................... 10
9. GRADUATE COURSE OFFERINGS (APPENDIX A) .................................................................. 10
9.a. DESIGN, SYSTEMS AND CONTROL: ......................................................................................... 10
9.b. FLUID MECHANICS SCIENCE AND ENGINEERING: ............................................................. 10
9.c. MECHANICS AND DYNAMICS OF SOLIDS: .......................................................................... 11
9.d. TRANSPORT PHENOMENA, THERMODYNAMICS AND ENERGY: ......................................... 11
9.e. MATHEMATICS ELECTIVES: ................................................................................................. 11
10. ACADEMIC STANDARDS (APPENDIX B) ................................................................................ 12
PhD Graduate Study in Mechanical & Aerospace Engineering

1. Overview
The graduate programs in Mechanical and Aerospace Engineering accommodate individual interests, and encourage independent and innovative study. Students are part of a diverse intellectual community dedicated to advancing the state of the art and practice of mechanical or aerospace engineering. The School for Engineering of Matter, Transport and Energy (SEMTE) offers the following graduate degrees in Aerospace Engineering:

- Master of Science (MS)—non-thesis/comprehensive exam option
- Master of Science (MS)—non-thesis/applied project option
- Master of Science (MS)—thesis option
- Masters in Passing (MIP)
- Doctor of Philosophy (PhD)
- Doctor of Philosophy with an Engineering Education concentration (PhD)
- 4+1 accelerated degrees between our BSE and MS (available only to current ASU undergraduates)

SEMTE currently offers the following graduate degrees in Mechanical Engineering:

- Master of Science in Engineering (MSE)—non-thesis/comprehensive exam option
- Master of Science in Engineering (MSE)—non-thesis/applied project option
- Master of Science (MS)—thesis option
- Masters in Passing (MIP)
- Doctor of Philosophy (PhD)
- Doctor of Philosophy with an Engineering Education concentration (PhD)
- 4+1 accelerated degrees between our BSE and MS (available only to current ASU undergraduates)

This document describes only the PhD degrees.

All of the programs stress a sound foundation in technical fundamentals, communication and professionalism. The MS and MSE degree programs prepare engineers for doctoral study or industrial positions that specialize in research, project management and product innovation. The doctoral program emphasizes original research and provides students with a strong background for employment by academic institutions, government laboratories and industrial research laboratories. The School offers a broad-based curriculum in design, systems and control; fluid mechanics science and engineering; mechanics and dynamics of solids; and transport phenomena, thermodynamics, and energy. Several interdisciplinary programs are also accessible. Modern computational and laboratory facilities are available to support timely research investigations. The following sections provide information about program requirements, policies, and curriculum.

2. Admissions Policy
It is the goal of the School to achieve balance, to the extent possible, between domestic and international students. The School will strive to achieve a representative population of under-represented groups as candidates for advanced degrees. All applicants who have complete applications and meet admission standards will be reviewed.
2. Admission Requirements

A minimum grade point average of 3.0 (on a 4.0 scale) is required for graduates of accredited United States institutions. ASU’s Graduate College is responsible for international grade point average interpretation.

All applicants are required to take the general Graduate Record Examination (GRE); a subject-specific GRE is not required.

Students who do not have English as their primary language are required to achieve minimum competencies. Please see http://graduate.asu.edu/admissions/international/english_proficiency for additional information and minimum score requirements.

Three letters of recommendation are required, using the on-line recommendation system. Applicants will enter in the recommenders’ contact information during the application. Recommenders will be sent an electronic letter of recommendation once the application fee has been paid.

All applicants are required to submit a statement of academic and career objectives and address the desire to pursue graduate studies at Arizona State University in the School for Engineering of Matter, Transport, and Energy (Statement of Purpose). This will be uploaded at the time of application and is highly recommended to be in .PDF format.

Additional information regarding admission can be found at: http://graduate.asu.edu/admissions.

2.b. Application Process

Apply to Arizona State University using the on-line application system at http://graduate.asu.edu/admissions. You may pay the application fee on-line using a credit card. The Graduate College will not process your application until the application fee has been paid.

Have official transcripts sent from all institutions attended to:
- Arizona State University
- Graduate College
- Interdisciplinary Building, B-Wing, Room 170
- P.O. Box 871003
- Tempe, Arizona 85287-1003

Official test scores (GRE and TOEFL) must be sent electronically directly from ETS using institution code 4007; leave the department code blank.

2.c. Application Status

You may check the status of your application by logging on to My.ASU.edu. You may contact SEMTE graduate personnel at semte@asu.edu if you have questions regarding your application; please make sure to include your full name, ASU ID 10-digit ID number, semester, and program for which you are applying in all correspondence.

Note: Please be sure that your full name appears exactly the same on all documents. Documents varying in name will not be linked together and will therefore be considered as incomplete.

3. Financial Support Policy

The School will allocate a limited number of graduate assistantships each year. The following guidelines will be used to determine the recipients of this support.

i) All financial support will be based on merit. Criteria used to determine merit will be the applicant’s GPA, GRE scores, TOEFL score (if applicable), letters of recommendation and Statement of Purpose. An online form is available for application for a teaching assistantship. To be considered for a research assistantship...
assistantship, applicants should contact faculty members listed as mechanical or aerospace engineering graduate faculty, as research assistantships are decided by individual faculty members.

ii) The decision as to whom will receive School financial support (i.e., from the general School fund) will be determined by the School’s service needs (e.g., teaching assistants). All graduate students on School support will be assigned appropriate teaching-related duties. International students must pass the SPEAK test with a minimum score of 55 to be eligible for School teaching assistantships.

iii) The decision as to whom will receive support from research grants and contracts in the form of a Research Assistant (RA) position will reside with the principal investigator from whose funds the student will be paid. Students may contact individual faculty to see what opportunities may exist.

iv) Students making satisfactory academic and program progress (see Section 6), subject to the availability of funds, are eligible to receive a maximum of three semesters of School support (a teaching assistantship) as MS/MSE candidates and five semesters of School support as PhD candidates. Students on academic probation or new provisionally admitted students are not eligible for School support.

v) Students receiving financial aid must register for 12 hours of credit each semester in total; these hours may include research and dissertation credits. These students must also register for MAE 594 Graduate Research Conference. Note that an audited course does not count toward the 12 hours and requires a petition to the School. If a student on a TA/RA position falls below 12 credit hours during the semester, the School has the right to revoke the TA/RA position and benefits. The 12-credit-hour registration requirement is only for the fall/spring. Students receiving a TA/RA position in the summer sessions must be enrolled in at least one credit hour.

4. Graduate Programs
4.a. Graduate Courses
Graduate course offerings in the School cover the classical areas, including aerodynamics and fluid mechanics, design and manufacturing, heat transfer and thermodynamics, solid mechanics and dynamics, and system dynamics and control as well as interdisciplinary topics in micro- and nanotechnology and sustainability. A list of current course offerings in these areas is given in Appendix A. Students must also satisfy a mathematics requirement. Courses that may be used to satisfy this requirement are also listed in Appendix A.

Audited courses do not apply toward the degree program and cannot be listed on the iPOS. In general SEMTE graduate students are not granted permission to audit a course until the student has filed a Plan of Study (iPOS) and has completed all coursework on the iPOS.

4.b. Doctor of Philosophy (PhD)
The Doctor of Philosophy (PhD) degree is directed toward original research. The student is required to write and defend a dissertation that describes an original contribution within the chosen discipline. The research results should be suitable for publication in a reputable, scholarly journal. The School currently offers majors in Aerospace Engineering, Aerospace Engineering (Engineering Education), Mechanical Engineering, and Mechanical Engineering (Engineering Education).
4. b. 1 Selection of a PhD Advisor
The student must select a program committee chair (faculty advisor) with the selection being made prior to completing 42 credit hours. The program committee chair’s name must be filed with the School’s graduate programs office through the Plan of Study (iPOS) accessed through the MyASU portal. A change of program committee chair requires approval of the Graduate Program Chair.

4. b. 2 PhD Qualifying Criteria
A graduate student pursuing a PhD program of study in Mechanical Engineering, must complete within the first year of his/her graduate studies at ASU, three (3) 500-level (preferably core) courses in the major area and one (1) 500-level mathematics course with an average GPA of 3.25 or above. Specific qualifying course requirements for each major area are identified below. Course substitutions, subject to approval by the student’s faculty advisor, are allowed. Students who do not meet the qualifying criteria will be placed on probation and may be removed from the program.

PhD Qualifying Courses -- Aerodynamics and Fluid Mechanics
Major: (i) MAE 571 Fluid Mechanics
(ii) MAE 561 Computational Fluid Dynamics
(iii) A choice of one of the following:
    MAE 572 Advanced High Speed Flows
    MAE 573 Viscous Flow
    MAE 564 Advanced Aerodynamics
    MAE 575 Turbulence
Mathematics: MAE 502 Partial Differential Equations in Engineering or the equivalent 500-level PDE course offered in the Mathematics Department

PhD Qualifying Courses -- Design and Manufacturing
Major: (i) MAE 540 Advanced Product Design Methodology
(ii) MAE 544 Mechanical Design and Failure Prevention
(iii) A choice of one of the following:
    MAE 541 CAD Tools for Engineers
    MAE 598 Polymers and Composites
    MAE 547 Mechanical Design and Control of Robots
Mathematics: MAE 501 Linear Algebra in Engineering

PhD Qualifying Courses -- Heat Transfer and Thermodynamics
Major: (i) Either MAE 589 Heat and Mass Transfer, MAE 581 Advanced Thermodynamics
(ii) Two of the following, that are different from (i) above:
    MAE 504 Experimental Methods for Thermal and Fluid Processes
    MAE 536 Combustion
    MAE 586 Convection Heat Transfer
    MAE 589 Heat and Mass Transfer
    MAE 581 Advanced Thermodynamics
    MAE 598 Nanoscale Heat Transfer
Mathematics: MAE 502 Partial Differential Equations in Engineering or the equivalent 500-level PDE course offered in the Mathematics Department
PhD Qualifying Courses -- Solid Mechanics and Dynamics
Major: (i) MAE 510 Dynamics and Vibrations
   (ii) MAE 520 Stress Analysis
   (iii) A choice of one of the following:
      MAE 515 Structural Dynamics
      MAE 524 Theory of Elasticity
Mathematics: A choice of one of the following:
      MAE 501 Linear Algebra in Engineering
      MAE 502 Partial Differential Equations in Engineering
      PHY 501 or PHY 502 Methods of Theoretical Physics or any 500-level course
      offered in the Mathematics Department

PhD Qualifying Courses -- System Dynamics and Control
Major: (i) MAE 506 Advanced System Modeling, Dynamics, and Control
   (ii) MAE 507 Optimal Control
   (iii) MAE 510 Dynamics and Vibrations (required for PhD in Mechanical Engineering)
Mathematics: MAE 501 Linear Algebra in Engineering

4.b.3 PhD Program Committee
University regulations note the possibility of having two separate supervisory committees, a Program Committee and a Dissertation Committee. In the School these will normally be one and the same and will be designated as the Program Committee (PC).

The PC chair, in consultation with the student, will establish a PC, the purposes of which are to:

1) Approve the plan of study (iPOS).
2) Provide guidance for the student's research.
3) Administer the comprehensive examination.
4) Administer the dissertation defense.

The PC shall consist of at least five ASU faculty members with the majority being from the Mechanical or Aerospace Engineering Graduate Faculty, but at least one being from outside the Mechanical or Aerospace Engineering Graduate Faculty. A listing of Aerospace graduate faculty may be found on the following website: http://graduate.asu.edu/graduate_faculty/degree/G10. The listing for Mechanical graduate faculty may be found on the following website: http://graduate.asu.edu/graduate_faculty/degree/G11

Participation of individuals from institutions external to ASU is encouraged, but these may be non-voting members as determined at the discretion of the Graduate Program Chair. Furthermore, the PC should have the following character:

1) Advisor (PC chair); must be from the Mechanical or Aerospace Engineering Graduate Faculty, and approved to chair a PhD dissertation committee.
2) Two or three additional faculty in the student's general area of research.
3) At least one faculty outside the student's general area of research (e.g., mathematics, physics, or other engineering disciplines).

Note: A change in the PC requires approval of the Graduate Program Chair and must be changed on the iPOS.
4.b.4 PhD Plan of Study (iPOS)

The student in consultation with his/her PC chair and the PC must file a POS prior to completing 42 credit hours. The POS must meet general University requirements including the need for rigorous fundamental knowledge of engineering principles. Candidates for the PhD degree must complete a minimum of 84 semester hours of course and dissertation work distributed below. Thirty (30) credit hours of appropriate coursework from a previously earned master’s degree may be applied toward the total credit hours; at least fifty-four (54) hours must be taken at Arizona State University. A minimum cumulative grade point average of 3.25 is required.

- At least eighteen (18) credit hours of coursework directly related to the research area (major)
- At least nine (9) credit hours of mathematics
- At least nine (9) credit hours of graduate courses outside the major research area; these must be restricted to mathematics, engineering and/or science
- Twelve (12) hours of MAE 799 dissertation
- MAE 792 research credit hours may be applied toward the 84 total hours

**Note:** The PC and the Graduate Program Chair must approve any changes to the POS.

**Note:** The University will block registration for students who have completed 42 credit hours and have not filed a POS. The registration block will not be removed from the student’s account until a POS has been filed and approved by the School, the Graduate College and the Graduation Office.

4.b.5 PhD Comprehensive Examination and Dissertation Proposal Prospectus

All students intending to earn the PhD degree are required to pass a comprehensive examination. The examination will be administered by the PC. The student must prepare a written dissertation prospectus, and submit that to the PC in advance of the examination. The prospectus is considered as the written component of the comprehensive exam. During the examination, the student will orally defend the prospectus to the PC and answer questions related to it, as well as on general principles related to the student’s field of study. This is considered as both the oral component of the comprehensive exam, and as the doctoral dissertation prospectus defense. It is the student’s responsibility to bring the required forms (Report of Doctoral Comprehensive Exams and Results of Doctoral Dissertation Proposal/Prospectus) to the defense and then to the graduate advisor for School processing. The forms may be found at: [http://engineering.asu.edu/semte/GradForms.html](http://engineering.asu.edu/semte/GradForms.html).

The comprehensive examination is taken after completing the PhD qualifying exam. Qualified PhD students should take the examination by their sixth semester as full-time students in the Mechanical or Aerospace Engineering PhD program. Part-time students should apprise the Graduate Program Chair of a timely schedule for exam completion. Students who do not take the comprehensive exam by the end of their sixth semester will be considered as not making satisfactory academic progress and may be recommended for removal from the program.

4.b.6 PhD in Mechanical or Aerospace Engineering with a Concentration in Engineering Education

Students pursuing the Doctor of Philosophy degree in Mechanical or Aerospace Engineering are eligible to apply for the Engineering Education concentration ([http://engineeringed.asu.edu/](http://engineeringed.asu.edu/)). The Engineering Education concentration combines research in engineering with research in education. The doctoral Engineering Education concentration will prepare students to become scholars, researchers or practitioners in academia. The proposed concentration provides students with an opportunity to explore pedagogy, methodology, and curriculum and instruction and apply it to engineering.
Students enrolled in the Engineering Education concentration under the PhD degree in Mechanical or Aerospace Engineering will complete

- Eighteen (18) credit hours of graduate MAE coursework (500 level and above),
- Nine (9) credit hours of graduate mathematics-oriented coursework (500 level and above),
- And fifteen (15) credit hours of graduate engineering education coursework, to consist of the following courses:

  - ENE 701: Foundations of Engineering Education (3 credit hours)
  - ENE 702: Assessment and Evaluation in Engineering Education (3 credit hours)
  - ENE 703: Research Methods in Engineering Education (3 credit hours)
  - ENE 704: Advanced Research Methods in Engineering Education (3 credit hours)
  - ENE 780: Engineering Education Practicum: Applied Project (3 credit hours)

Three (3) of these courses will count towards the nine (9) “elective” credit hours required for the PhD degree in mechanical or aerospace engineering.

The program is directed toward original research. The students will be required to write and defend a dissertation that describes an original contribution within the chosen engineering discipline that integrates an education component (i.e., research on engineering pre-university programs, undergraduate engineering curriculum and instruction, etc.). The research results should be suitable for publication in a peer-reviewed journal. The PhD dissertation committee must include at least two (2) members from education-related disciplines. Designation of one of these two members as the dissertation co-chair is encouraged but not required. Students will be required to satisfy all MAE qualifying and comprehensive requirements and to abide by all policies set forth by the School for Engineering of Matter, Transport, and Energy. Note that the Engineering Education concentration, in effect, requires six (6) credit hours of coursework beyond the minimum required for a PhD in mechanical or aerospace engineering with no concentration. Students wishing to pursue the Engineering Education concentration must apply directly to that concentration and are not able to submit a plan change; if a student is admitted into this concentration and wishes to pursue a general Mechanical or Aerospace engineering degree, s/he will have to reapply to the general PhD program.

**4.b.7 PhD Candidacy**

PhD students achieve candidacy status in a letter from the Graduate College Dean upon passing the comprehensive examination and successfully defending the dissertation prospectus with an approved iPOS on file. This is sent directly from the Graduate College and is found in the MyASU system.

**4.b.8 PhD Final Oral Examination**

The dissertation defense is an oral and public examination administered by the PC in accordance with Graduate College guidelines. The purpose of the examination is to evaluate the student’s research efforts and written presentation (dissertation), and to determine if the candidate is worthy of receiving a PhD degree. The major area of emphasis of this examination is the student’s research dissertation and the general areas of study related thereto. The final dissertation defense must be taken within five years of passing the comprehensive examination. It is the student’s responsibility to adhere to and be familiar with the deadlines set forth by the Graduate College regarding defenses. Students must be registered in at least one credit hour at the time of their defense.

**4.c. Masters in Passing (MIP)**

Students who are enrolled in the Mechanical or Aerospace Engineering PhD program and who do not have a previously earned MS or MSE degree may apply for a Masters in Passing (MIP) upon completion of 30 hours of appropriate graduate coursework. The MIP requires a separate iPOS from the PhD and all
grades must be entered before the MIP can be awarded. Contact the School’s graduate programs personnel for additional information.

5. Milestones and Timeline

5.a. PhD Degree
i) Identify a dissertation advisor from the MAE Graduate Faculty. This should be done as soon as possible, but no later than the second semester of study.
ii) Complete qualifying course requirements – within the first year.
iii) File Plan of Study – prior to completion of 42 credit hours.
iv) Complete comprehensive examination and dissertation prospectus defense; submit form to graduate advisor.
v) Apply for graduation – please see the Academic Calendar for deadlines at: [http://students.asu.edu/academic-calendar](http://students.asu.edu/academic-calendar)
vi) Submit Doctoral Defense Schedule Form ([http://www.asu.edu/graduate/forms](http://www.asu.edu/graduate/forms)) a minimum of ten business days before defense date to the Graduate College.
vii) Submit dissertation for format approval – please see the Graduate College deadlines and procedures for additional information: [http://graduate.asu.edu/graddeadlines.html](http://graduate.asu.edu/graddeadlines.html)
viii) Submit dissertation title, date/time/location of defense, and abstract to the School’s graduate advisor for internal posting.
ix) Hold oral defense of dissertation – please see the Graduate College deadlines and procedures for additional information: [http://graduate.asu.edu/graddeadlines.html](http://graduate.asu.edu/graddeadlines.html). Bring the graduate advisor a copy of the pass/fail form for School processing
x) Pick up pass/fail form from Graduate College
xi) Submit dissertation to ProQuest as directed by the Graduate College through the MyASU system.
xii) Submit a copy of the ProQuest receipt to the graduate advisor for changes of “Z” grades to “Y” grades
xiii) Commencement date – See academic calendar.

Note: Maximum time limit – Oral defense of dissertation must be held within ten (10) years or within five (5) years of passing the comprehensive examinations, whichever occurs first.

Note: Doctoral students must maintain consecutive semester enrollment or have an approved petition for leave of absence on file. If a student does not register for a minimum of one graduate credit hour during a semester an application as a new PhD student must be filed. If re-admitted to the degree program the student may forfeit some previously taken courses and completed exams.

6. Satisfactory Standing
All PhD students a cumulative GPA of 3.25 in course work approved under their plan of study to maintain good standing. Ira A. Fulton School of Engineering guidelines on retention are to be strictly enforced; see Appendix B. Note that School requirements for PhD students are more stringent than those of the Ira A. Fulton Schools of Engineering.

7. Graduate Student Advising
For initial advising, incoming students will report to the Graduate Program Chair who may arrange for a temporary advisor based on the student’s stated area of interest. The initial faculty advisor should be considered temporary until such time as a permanent PC chair is designated. If a particular faculty member on a research grant or contract is directly supporting an incoming student, that faculty person
will be the PC chair. The graduate advisor can assist with the process towards completing the degree, not academic content (i.e. registration, iPOS questions).

8. Admission to PhD Program Without MS or MSE
A highly qualified graduate student may be permitted to bypass the MS or MSE and proceed directly to the PhD program prior to completing 12 credit hours of graduate-level coursework. Students may also apply directly to the PhD program without an MS or MSE degree. A student may change to the PhD program after completing 12 credit hours, but only 12 credit hours from the master’s coursework completed at Arizona State University may count towards the PhD.

The Graduate Affairs Committee (GAC) will consider a request for an MSE or MS student to change to the PhD program after receiving the following:

- A letter of intent from the student.
- Formal application to the Graduate College (http://graduate.asu.edu/admissions).
- Other appropriate supporting materials.

Approval of the request requires a majority vote of the GAC and the approval of the Graduate College. A student, who has qualified to bypass the MS or MSE degree, may return to the MS or MSE program upon his or her request and filing a Change of Plan through MyASU, however only nine (9) of the credit hours completed towards the PhD may be used towards the MS or MSE.

9. Graduate Course Offerings (Appendix A)
Listed below are the graduate course offerings in a given research area. A full description of the courses is provided in the ASU catalog. Course selection must be determined in consultation with the PC chair.

9.a. Design, Systems and Control:
- MAE 506 Advanced System Modeling, Dynamics and Control
- MAE 507 Optimal Control
- MAE 527 Finite Elements for Engineers
- MAE 540 Advanced Product Design Methodology
- MAE 541 CAD Tools for Engineers
- MAE 544 Mechanical Design and Failure Prevention
- MAE 546 Advanced CAE Simulation
- MAE 547 Mechanical Design and Control of Robots

9.b. Fluid Mechanics Science and Engineering:
- MAE 504 Experimental Methods in Thermal and Fluid Processes
- MAE 527 Finite Elements for Engineers
- MAE 536 Combustion
- MAE 561 Computational Fluid Dynamics
- MAE 564 Advanced Aerodynamics
- MAE 566 Rotary-Wing Aerodynamics
- MAE 571 Fluid Mechanics
MAE 572 Advanced High-Speed Flows
MAE 573 Viscous Fluid Flow
MAE 574 Fluid Transport in Micro/Nanoscale Devices
MAE 575 Turbulence
MAE 577 Turbulent Flow Modeling
MAE 578 Geophysical and Environmental Fluid Dynamics

9.c. Mechanics and Dynamics of Solids:
MAE 510 Dynamics and Vibrations
MAE 512 Random Vibrations
MAE 515 Structural Dynamics
MAE 520 Stress Analysis
MAE 521 Structural Optimization
MAE 523 Fracture Mechanics
MAE 524 Theory of Elasticity
MAE 525 Mechanics of Smart Materials and Structures
MAE 527 Finite Elements for Engineers
MAE 557 Mechanics of Composite Materials

9.d. Transport Phenomena, Thermodynamics and Energy:
MAE 504 Experimental Methods in Thermal and Fluid Processes
MAE 527 Finite Elements for Engineers
MAE 536 Combustion
MAE 561 Computational Fluid Dynamics
MAE 581 Advanced Thermodynamics
MAE 585 Conduction Heat Transfer
MAE 586 Convection Heat Transfer
MAE 587 Radiation Heat Transfer
MAE 589 Heat and Mass Transfer

9.e. Mathematics Electives:
MAE 501 Linear Algebra in Engineering
MAE 502 Partial Differential Equations in Engineering
MAE 505 Perturbation Methods
MAT 500 level or above courses
APM 500 level or above courses
STP 500 level or above courses
PHY 501 Methods of Computational and Theoretical Physics
PHY 502 Methods of Theoretical Physics
EEE 550 Transform Theory and Applications

10. Academic Standards (Appendix B)

Policy for Maintaining Academic Satisfactory Progress

A student who has been admitted to an MS or MSE degree program in Mechanical or Aerospace Engineering, with either regular or provisional admission status, must maintain a 3.0 or higher grade point average (GPA) as stated below. A student who has been admitted to a PhD degree program in Mechanical or Aerospace Engineering, with either regular or provisional admission status, must maintain a 3.25 or higher grade point average (GPA) as stated below.

1. In all work taken for graduate credit (courses numbered 500 or higher);
2. In the coursework on the student’s approved plan of study, and
3. In all post baccalaureate coursework taken at ASU (overall GPA).

A. A student will be placed on academic probation if:
   o One or more of the student's GPAs listed above falls below 3.0 (MS or MSE) or 3.25 (PhD) respectively;
   o Or the student receives a grade of D or E in a course at the 400 level or above;
   o If a student does not successfully complete the milestones as required for the degree (i.e. passing comprehensive exams in the semester outlined in the student handbook).

Students will be notified by mail when placed on academic probation.

B. A student will return to academic good standing by obtaining a minimum 3.0 (MS or MSE), or 3.25 (PhD) in the GPAs listed above by the time the next nine hours are completed. Coursework such as research and thesis/dissertation registration that are for Z or Y grade, 400 level coursework, and audit courses cannot be included in these nine hours. The next nine (9) credit hours must be completed the semester following the semester that the student is placed on academic probation, for full-time students. For part-time students, the next nine (9) credit hours must be completed within three (3) semesters following the semester that the student is placed on academic probation.

C. A student may be recommended for dismissal from a graduate program if:
   o The student fails to increase all of the GPAs listed above to a minimum of 3.0 (MS or MSE) or 3.25 (PhD) by the time he/she completes the next nine credit hours as defined in section B;
   o Or the student receives a grade of D or E while on academic probation for any reason;
   o Or a provisionally admitted student fails to meet the required provision(s) of admission;
- Does not successfully meet the program milestones
- Fails comprehensive exams or culminating experiences twice

A student may appeal actions concerning dismissal by petitioning the School unit in which they are enrolled.