



UNIVERSITY OF
MARYLAND

Department of Fire Protection Engineering
A. JAMES CLARK SCHOOL OF ENGINEERING

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Guide to Graduate Study Policies and Procedures (FPE Department) September, 2019

1. INTRODUCTION

The Department of Fire Protection Engineering (FPE) offers an environment for advanced graduate study and research in the broad area of fire safety. The department offers a Master of Science (M.S.) degree through ENFP, a Master of Engineering (M.Eng.) degree, a Graduate Certificate in Engineering through ENPM, and courses outside of a degree program for those with the status of Advanced Special Students. The M.S. is offered on-campus (<http://www.fpe.umd.edu/grad/ms>); the M.Eng. and Graduate Certificate in Engineering are offered both on-campus and online (<https://advancedengineering.umd.edu/fire-protection>).

Information on the on-campus degree programs may be obtained from the FPE Director of Graduate Studies, Dr. Arnaud Trouvé (atrouve@umd.edu). Information on the distance option for the M.Eng. degree, Graduate Certificate in Engineering, or non-degree programs may be obtained from Dr. James A. Milke (milke@umd.edu), FPE Professor and Chair, and Director of the FPE Distance Learning Program.

This guide has been prepared as an aid to graduate students and faculty. It describes the policies, rules and regulations concerning graduate studies in the FPE department, including the responsibilities of both the student and advisor. Many of these rules have evolved since the initiation of the graduate program. Others are relatively new statements of policy that are necessary for a reasonable organization of the graduate program.

Additional information about fire protection engineering graduate program and requirements for M.S. degrees are available in the UMD Graduate Catalog (<http://apps.gradschool.umd.edu/catalog/>). This Guide provides details such as policy and procedures. **All policies adopted by the Graduate School supersede those stated in this Guide.** Furthermore, because the policies included in this Guide are constantly under evaluation, the FPE department may choose to deviate from the policies stated in this Guide.

Goals of the FPE Graduate Program

The mission of the Department of Fire Protection Engineering is to reduce the burden of fire losses on life and property by providing the highest quality of scientifically-based education, research and outreach in fire protection engineering, and in fire-related safety, health and environmental issues. The FPE graduate program provides the unique interdisciplinary academic foundation and

scholarly training needed to address complex engineering problems with emphasis on advancing the field of fire protection engineering.

The educational objectives of the FPE M.S. and M.Eng degree programs are to produce graduates who:

- Have the technical knowledge and skills needed to practice fire protection engineering locally, nationally and internationally in a variety of modern professional settings;
- Have the ability to understand and communicate societal, environmental, economic and safety implications of engineering decisions on the local and global communities;
- Are prepared to attain professional certification and licensure;
- Appreciate the need to maintain continual professional competency and to practice ethically;
- Are prepared to participate in the development and promotion of fire protection engineering and assume technical and/or business leadership positions.

Some additional educational objectives specific to the FPE M.S. degree program are to produce graduates who:

- Appreciate the importance of scientific research as a mechanism to strengthen the technical basis of fire protection engineering;
- Have the basic competencies needed to pursue advanced studies (*e.g.*, Ph.D.) in fire protection engineering or related fields.

The program is designed to stimulate intellectual growth, increase the level of objective understanding of the physical world and further develop capabilities for analysis and synthesis in order to produce premier fire safety engineers and/or researchers. Students are expected to graduate after 12 months (BS/MS students) or 16 months (non BS/MS students) in the program.

Doctor of Philosophy (Ph.D.) Degree

The FPE department does not confer a Ph.D. degree. However, students may pursue a Ph.D. degree with a strong emphasis on fire protection engineering by enrolling in the Ph.D. programs of other UMD departments, such as Mechanical, Aerospace or Civil Engineering. In each case, students will fulfill the requirements of the specific department that is hosting them. Fire Protection Engineering faculty are affiliated with these departments and can serve as Ph.D. advisors. Information on the Ph.D. degree options may be obtained from the FPE Director of Graduate Studies, Dr. Arnaud Trouvé (atrouve@umd.edu).

2. ADMISSION REQUIREMENTS AND PROCEDURES

The decision to admit students into the FPE M.Eng. and Graduate Certificate in Engineering degree programs is made by the Office of Advanced Engineering Education. Visit the OAEE website for more information on admission requirements for both the on-campus and the online options (<https://advancedengineering.umd.edu/application-process>).

The information in this section is for students applying to the FPE M.S. degree program. The decision to admit students into the FPE M.S. degree program is made by the Graduate School after

reviewing the recommendations of the department based on the applicant's ability to carry out scholarly work at the graduate level.

Admissions Procedures

- a. The application and supporting documentation are submitted to the Graduate School (**Application deadlines:** go to <https://academiccatalog.umd.edu/graduate/programs/fire-protection-engineering-enfp/#admissionstext>). The application file includes: a resume; an essay or statement of goals and experiences; three letters of recommendation; and official copies of transcripts. For applicants who obtained a B.S. degree from the UMD FPE department, the application material may be reduced to: a resume; an essay or statement of goals and experiences; and one letter of recommendation. In most cases, the application process requires scores from the Graduate Record Examination (GRE). In addition, in the case of international applicants from non-English speaking countries, the application process requires scores from the Test of English as a Foreign Language (TOEFL) or the International English Language Testing System (IELTS). Information on the application system and processes may be obtained from the FPE Assistant Director for Student Services, Nicole Hollywood (*Email:* nlholly@umd.edu; *Tel.:* (1) 301-405-3994).
- b. The Graduate School forwards a summary of the application to the FPE department. For international applicants, the file is also sent to the International Student & Scholar Services (ISSS) for evaluation of the applicant's academic record, English language skills, and financial support.
- c. The application is reviewed by the FPE department's Director of Graduate Studies.
- d. The recommendation of the FPE Director of Graduate Studies is sent to the Graduate School.
- e. The Graduate School (and ISSS for international applicants) reviews the applicant's file again, makes the final decision, notifies the applicant of the final decision, and gives detailed instructions to successful applicants for completion of their registration.

Minimum Requirements

- a. Applicants should have a B.S. degree in engineering, or a related field from an accredited institution.
- b. Applicants should have taken the following 4 prerequisite courses: differential equations, fluid mechanics, heat transfer, structural mechanics (or strength of materials). Applicants who have not completed all prerequisites may still be admitted on a provisional basis if they demonstrate satisfactory academic performance in a related field and/or relevant work experience; these applicants would then be asked to complete the prerequisite courses during their first semester at UMD; note that provisional admission remains an exception and that corresponding applications are evaluated on a case-by-case basis.
- c. Applicants should have an undergraduate GPA of at least 3.0/4.0.
- d. Applicants from non-English speaking countries should satisfy the requirement of the International Student & Scholar Services (ISSS), which generally involves submitting scores from the Test of English as a Foreign Language (TOEFL) or the International English Language Testing System (IELTS). For more information, visit

<http://globalmaryland.umd.edu/offices/international-students-scholar-services/graduate-admissions> and <https://gradschool.umd.edu/admissions/english-language-proficiency-requirements>.

3. SELECTION OF COURSEWORK ADVISOR

Each graduate student in the department has a coursework advisor.

- M.Eng. graduate students enrolled in the online program are advised by Dr. James A. Milke (milke@umd.edu), FPE Professor and Chair, and Director of the FPE Distance Learning Program.
- M.Eng. graduate students enrolled in the on-campus program are advised by Dr. Arnaud Trouvé (atrouve@umd.edu), FPE Professor and Director of Graduate Studies.
- M.S. graduate students are advised by the member of the FPE faculty who they have elected as their Thesis advisor: each new M.S. graduate student entering the department must initiate contact with the faculty to obtain an advisor based on his/her indicated research area of interest. The FPE Director of Graduate Studies, Dr. Arnaud Trouvé (atrouve@umd.edu), is available to facilitate these contacts; the M.S. advisor should be identified by the end of the student's first semester of study. A M.S. student may elect to change advisors, subject to the approval of the new advisor, at any later date.

4. DEGREE REQUIREMENTS FOR THE MASTERS DEGREES

4.1 M.S. degree

- a. Complete 8 approved courses (24 credits) in agreement with the requirements listed in Section 5.1. Complete at least 6 credits of thesis research (ENFP799).
- b. Maintain a GPA of 3.0 or better.
- c. Submit a satisfactory M.S. thesis and successfully defend the thesis in an oral examination.
- d. Have at least 1 credit of registration in the graduation semester or Summer term.
- e. Complete the degree within 5 years.

4.2 M.Eng. degree

- a. Complete 10 approved courses (30 credits) in agreement with the requirements listed in Section 5.2.
- b. Maintain a GPA of 3.0 or better.
- c. Have at least 1 credit of registration in the graduation semester or Summer term.
- d. Complete the degree within 5 years.

5. COURSEWORK REQUIREMENTS

Each graduate student should propose a list of courses to be taken that will fulfill the coursework requirement. This list should be discussed with the student's coursework advisor (see Section 3 above). Acceptability of the proposed list, as determined by the coursework advisor and approved by the FPE Director of Graduate Studies for on-campus students or the Director of the FPE

Distance Learning Program for distance students, should be based on the student's stated objectives and background.

5.1 M.S degree

5.1.1 Combined B.S./M.S. Degree Programs

Students in the UMD FPE B.S. program may apply to the combined B.S./M.S. degree program. This requires a 3.50 (or higher) UMD UG cumulative GPA and 90 (or more) UMD UG cumulative credits. Application to the combined degree program is a two-step process. In the first step, students must submit a Combined Bachelor's/Master's Degree Form (<http://eng.umd.edu/forms-requests>). This form identifies the 3 graduate courses that are counted for both undergraduate/graduate degrees; it should be submitted to 1131 Martin Hall at least one day before the first meeting of the student's first 600+ class. In the second step, students must apply to the UMD graduate school (<https://www.gradschool.umd.edu/admissions/application-process/step-step-guide-applying>). Deadlines for applying to the FPE graduate program may be found at <https://academiccatalog.umd.edu/graduate/programs/fire-protection-engineering-enfp/#admissionstext>.

The combined B.S./M.S. degree program allows students to complete the combined degrees in a nominal time of 5 years. Interested and qualified undergraduates should take 3 graduate courses (9 credits) after reaching 90 degree credits. These 9 credits will be counted as part of their coursework requirement for both of their combined degrees. The 600+ courses that can be considered for this purpose are selected from the following paired 400/600 level courses:

ENFP405/621	Structural Fire Protection/Analytical Procedures of Structural Fire Protection
ENFP410/653	Special Hazard Suppression Systems/Advanced Fire Suppression
ENFP413/613	Advanced Life Safety Analysis/Human Response to Fire
ENFP415/651	Fire Dynamics/Advanced Fire Dynamics
ENFP440/627	Smoke Management and Fire Alarm Systems/Smoke Detection and Management
ENFP464/664	Industrial Fire Safety
ENFP465/665	Fire and Explosion: Investigation and Reconstruction
ENFP489W/629W	Wildland Fires: Science and Applications

Note that each paired 400/600 level courses is treated as a single course and students (whether B.S., B.S./M.S., M.S. or M.Eng. students) can only take the course once.

Additional requirements for the completion of the combined degree programs include:

- Two courses selected from among:

ENFP611	Fire Induced Flows
ENFP620	Fire Dynamics Laboratory
ENFP626	Computational Fire Modeling
ENFP630	Diffusion Flames and Burning Rate Theory
ENFP671	Material Flammability

- One engineering mathematics course, approved by the student's advisor, based on the student's intended course of study and research. Examples of approved mathematics courses include: MATH, STAT or AMSC 400+; or any of the following:

ENCE621	Uncertainty Modeling and Analysis
ENME605	Advanced Systems Control: Linear Systems
ENME610	Engineering Optimization
ENME625	Multidisciplinary Optimization
ENME673	Energy and Variational Methods in Applied Mechanics
ENRE620	Mathematical Techniques of Reliability Engineering
ENRE643	Bayesian Analysis
ENRE655	Advanced Methods in Reliability Modeling

- Two courses of the student's choice at the 400+ level subjected to approval of the FPE Director of Graduate Studies.

5.1.2 Non-Combined M.S. Degree Program for Students Holding a UMD FPE B.S. Degree

Students in the UMD FPE B.S. program may apply to the M.S. degree program. Requirements for the completion of the combined degree programs include:

- Two courses selected from among:

ENFP611	Fire Induced Flows
ENFP620	Fire Dynamics Laboratory
ENFP626	Computational Fire Modeling
ENFP630	Diffusion Flames and Burning Rate Theory
ENFP671	Material Flammability

- Two courses at the 600+ level selected from the following list:

ENFP464/664	Industrial Fire Safety
ENFP465/665	Fire and Explosion: Investigation and Reconstruction
ENFP489W/629W	Wildland Fires: Science and Applications
ENFP654	Fire Suppression Sprays

Note that each paired 400/600 level courses is treated as a single course and students (whether B.S., B.S./M.S., M.S. or M.Eng. students) can only take the course once.

- One engineering mathematics course, approved by the student's advisor, based on the student's intended course of study and research. Examples of approved mathematics courses include: MATH, STAT or AMSC 400+; or any of the following:

ENCE621	Uncertainty Modeling and Analysis
ENME605	Advanced Systems Control: Linear Systems
ENME610	Engineering Optimization
ENME625	Multidisciplinary Optimization
ENME673	Energy and Variational Methods in Applied Mechanics
ENRE620	Mathematical Techniques of Reliability Engineering
ENRE643	Bayesian Analysis
ENRE655	Advanced Methods in Reliability Modeling

- Three courses of the student's choice at the 400+ level, at least one of which need to be in the FPE department, and subjected to approval of the FPE Director of Graduate Studies.

5.1.3 M.S. Degree Program for Students Not Holding a UMD FPE B.S. Degree

For students who join the Fire Protection Engineering program from other disciplines, the following course is required:

ENFP651 Advanced Fire Dynamics

- Two courses selected from among:

ENFP611 Fire Induced Flows
ENFP620 Fire Dynamics Laboratory
ENFP626 Computational Fire Modeling
ENFP630 Diffusion Flames and Burning Rate Theory
ENFP671 Material Flammability

- Four courses at the 600+ level selected from the following list:

ENFP405/621 Structural Fire Protection/Analytical Procedures of Structural Fire Protection
ENFP410/653 Special Hazard Suppression Systems/Advanced Fire Suppression
ENFP413/613 Advanced Life Safety Analysis/Human Response to Fire
ENFP440/627 Smoke Management and Fire Alarm Systems/Smoke Detection and Management
ENFP464/664 Industrial Fire Safety
ENFP465/665 Fire and Explosion: Investigation and Reconstruction
ENFP489W/629W Wildland Fires: Science and Applications
ENFP601 Fundamentals of Fire Safety
ENFP654 Fire Suppression Sprays

Note that each paired 400/600 level courses is treated as a single course and students (whether B.S., B.S./M.S., M.S. or M.Eng. students) can only take the course once.

- One engineering mathematics course, approved by the student's advisor, based on the student's intended course of study and research. Examples of approved mathematics courses include: MATH, STAT or AMSC 400+; or any of the following:

ENCE621 Uncertainty Modeling and Analysis
ENME605 Advanced Systems Control: Linear Systems
ENME610 Engineering Optimization
ENME625 Multidisciplinary Optimization
ENME673 Energy and Variational Methods in Applied Mechanics
ENRE620 Mathematical Techniques of Reliability Engineering
ENRE643 Bayesian Analysis
ENRE655 Advanced Methods in Reliability Modeling

5.2 M.Eng. degree

5.2.1 Combined B.S./M.Eng. Degree Programs

Students in the UMD FPE B.S. program may apply to the combined B.S./M.Eng. degree program. This requires a 3.50 (or higher) UMD UG cumulative GPA and 90 (or more) UMD UG cumulative credits. Application to the combined degree program is a two-step process. In the first step, students must submit a Combined Bachelor's/Master's Degree Form (<http://eng.umd.edu/forms-requests>). This form identifies the 3 graduate courses that are counted for both

undergraduate/graduate degrees; it should be submitted to 1131 Martin Hall at least one day before the first meeting of the student's first 600+ class. In the second step, students must apply to the UMD graduate school (<https://www.gradschool.umd.edu/admissions/application-process/step-step-guide-applying>). Deadlines for applying to the FPE graduate program may be found at <https://academiccatalog.umd.edu/graduate/programs/fire-protection-engineering-pmfp/#admissionstext>.

The combined B.S./M.Eng degree program allows students to complete the combined degrees in a nominal time of 5 years. Interested and qualified undergraduates should take 3 graduate courses (9 credits) after reaching 90 degree credits. These 9 credits will be counted as part of their coursework requirement for both of their combined degrees. The 600+ courses that can be considered for this purpose are selected from the following paired 400/600 level courses:

ENFP405/621	Structural Fire Protection/Analytical Procedures of Structural Fire Protection
ENFP410/653	Special Hazard Suppression Systems/Advanced Fire Suppression
ENFP413/613	Advanced Life Safety Analysis/Human Response to Fire
ENFP415/651	Fire Dynamics/Advanced Fire Dynamics
ENFP440/627	Smoke Management and Fire Alarm Systems/Smoke Detection and Management
ENFP464/664	Industrial Fire Safety
ENFP465/665	Fire and Explosion: Investigation and Reconstruction
ENFP489W/629W	Wildland Fires: Science and Applications

Note that each paired 400/600 level courses is treated as a single course and students (whether B.S., B.S./M.S., M.S. or M.Eng. students) can only take the course once.

Additional requirements for the completion of the combined degree programs include a selection of seven courses in math and engineering, at least three of which need to be in the FPE department. Two courses of the student's choice may be at the 400+ level subjected to approval of the department.

5.2.2 Non-Combined M.Eng. Degree Program for Students Holding or Not Holding a UMD FPE B.S. Degree

Students in the UMD FPE B.S. program or students who join the Fire Protection Engineering program from other disciplines may apply to the M.Eng. degree program. Requirements for the completion of the M.Eng. degree program include ten courses in math and engineering, at least six of which need to be in the FPE department. Two courses of the student's choice may be at the 400+ level subjected to approval of the department.

6. REQUIREMENTS FOR THESIS RESEARCH

A M.S. candidate must perform a body of research commensurate with the level of the Master of Science's Degree. The M.S. thesis should make a contribution to the advancement in the state-of-the-art of fire safety science and/or engineering. With this objective in mind, M.S. students are strongly encouraged to adopt the quality standards of the fire research community and to submit their research contribution for publication in an archival journal and/or for presentation in a professional meeting. During his/her Thesis work, the M.S. student is assisted and supervised by his/her advisor (see Section 3).

The procedure for review of a M.S. thesis is as follows:

- a. The student, in consultation with his/her faculty advisor, proposes a committee of at least three members of the Graduate Faculty to review the thesis (with the advisor as the chair of the committee). Committee members should have backgrounds and interests related to the subject matter of the thesis. The committee must be approved by the Graduate School by submitting the form “*Nomination of Thesis or Dissertation Committee.*” (http://www.gradschool.umd.edu/sites/gradschool.umd.edu/files/uploads/nomination_of_thesis_or_dissertation_committee_form.pdf)
- b. The student is responsible for providing each committee member with a typed, advisor-approved copy of the thesis manuscript at least one week before the oral examination (the “defense”).
- c. The committee should judge the quality of the research as well as the clarity and literary correctness of the thesis. The student is responsible for meeting any requirement of style or format stipulated by the Graduate School (the student is expected to review the *Electronic Thesis and Dissertation Style Guide* available at https://gradschool.umd.edu/sites/gradschool.umd.edu/files/uploads/DissertationThesis/etd_style_guide_201708.pdf).
- d. An oral examination (“defense”) on the thesis and coursework is required and is administered by the committee. The advisor is responsible for planning, providing notices and holding this defense. The defense is typically 2 hours long.
- e. For committees with three members, the thesis and defense must have unanimous approval. For committees with more than three members, up to one negative vote is acceptable.
- f. Should a student not pass the defense, the defense may be repeated once.
- g. **The student is responsible for meeting all deadlines of the Graduate School.** These include the submission of all forms identified in Section 7 of this Guide.

Visit <https://academiccatalog.umd.edu/graduate/policies/masters-degrees-policies/> and <https://gradschool.umd.edu/students/academic-progress/thesis-and-dissertation-filing> for more information.

Information regarding the procedure to submit candidacy for graduation:

- a. The student must submit an Application for Graduation, the Approved Program Form and all Thesis related forms by the posted deadlines of the Graduate School. For more information on forms, please see the Forms section of this Guide.
- b. If a student does apply for candidacy but does not submit these forms by the posted deadlines, he/she will NOT be considered for graduation in the term for which they originally applied. Instead, his/her candidacy will be moved to the following term. Continuous registration may be required. Questions or concerns may be addressed to the FPE Assistant Director for Student Services, Nicole Hollywood (*Email: nlholly@umd.edu; Tel.: (1) 301-405-3994*).

7. FORMS

Forms must be submitted to the Graduate School at key points during a student's graduate program. These forms include:

- a. *"Application for Graduation"*: the application must be submitted at the beginning of any semester during which the student believes he/she may complete all requirements for the degree (the application must be re-submitted in any subsequent semester if the student does not finish during the semester for which he/she first applied).
- b. *"Approved Program for the Master of"*: in general, the form must be submitted during the first month of the final semester.
- c. *"Nomination of Thesis or Dissertation Committee"*: the form must be submitted at least 6 weeks before the scheduled defense.
- d. *"Thesis and Dissertation Electronic Publication Form"*: the deadline to submit this form depends on the semester of graduation (for more information, visit <https://gradschool.umd.edu/calendar/deadlines/academic-deadlines>).

For more information on forms and deadlines, visit <http://www.gradschool.umd.edu/calendar/deadlines> and <http://www.gradschool.umd.edu/forms>.

8. FINANCIAL SUPPORT

Information on UMD tuition and fees can be found at <https://billpay.umd.edu/GraduateTuition>. The FPE department offers several types of financial support through various research assistantships (RA) or partial or full teaching assistantships (TA) (see the Table below).

Research assistantships are awarded by individual faculty members from their research budgets. These RA positions are limited by available resources and are dependent on the number of research grants awarded to the faculty. Therefore, these assistantships are awarded on a strictly competitive basis. There is no guarantee that once financial assistance is granted to a student, it will continue for the duration of the student's program. Such continuation is dependent upon the student's individual competitive standing in light of the available resources and performance as a research assistant. Every effort is made to be as fair and equitable as possible. Individual faculty members directing the funded research activity are responsible for informing students of sub-par performance. It is the student's responsibility to contact the faculty members to seek and secure RA funding. The FPE department's Director of Graduate Studies is available to facilitate these contacts.

The department also offers partial or full teaching assistantships. The partial TA positions cover 50% of the academic stipend and require a commitment of 10 hours per week to teaching assignments (*e.g.* grading, proctoring, *etc*); the partial TA is typically limited to the academic year (9 months) and does not provide summer support. The full TA positions cover 100% of the academic stipend and require a commitment of 20 hours per week to teaching assignments; the positions extend throughout the calendar year (12 months) and provide summer support. The full TA positions are dedicated to the FPE Distance Learning Program.

The stipends for graduate assistantships have been standardized in the School of Engineering (for more information, visit <https://clarknet.eng.umd.edu/sites/default/files/documents/2020/GA%20Scale%20FY%202020.pdf>). Benefits are offered with any appointment (other than hourly), including health insurance and tuition remission.

For more information, visit <http://www.eng.umd.edu/research/opportunities>. For questions or inquiries related to TA or RA opportunities, contact Dr. Arnaud Trouvé (atrouve@umd.edu).

Students are also encouraged to seek other external funding opportunities, for instance via UMD work-study programs (visit <http://www.careerengr.umd.edu>) and internships available in fire laboratories and FPE consulting companies in the Baltimore-Washington area.

Types of Graduate Assistantships

Type	Hours obligated	Appointment	Benefits
Full GA	20 hours/week during academic year; 40 hours/week during summer	100% RA	Full health and full tuition*
Distance TA	20 hours/week throughout the calendar year	100% TA	Full health and full tuition*
Partial TA	10 hours/week during the academic year; no summer support	50% TA	Full health and pro-rated tuition (50%)

*Full tuition means 10 credits during Fall or Spring semesters and 5 credits during Summer

9. EXIT INTERVIEW FOR M.S. GRADUATES

An exit interview is administered by the FPE Director of Graduate Studies asking M.S. students who have completed all of their degree requirements for evaluation and comments on the M.S. degree program objectives and curriculum. The exit interview will typically take place shortly after the M.S. thesis defense.