MIT ESD

Massachusetts Institute of Technology
Engineering Systems Division

Name	

Doctoral Program Form

Like your research, your ESD doctoral program will be challenging and unique. This form is a guide to help you construct a program that incorporates all of the essentials: fundamental and applied engineering systems thinking, domain knowledge, and methodological rigor.

With the exception of ESD.83, all of the required 150 program units are flexible. The ESD Doctoral Program will acknowledge coursework taken previously and even elsewhere if it is integral to your program and is, by the standards of the ESD Faculty, doctoral-level material. The first determination on suitability for inclusion in these cases is made by your doctoral committee. Final approval is granted by the Education Committee. Refer to the footnote (†) for guidelines on determining units and levels for external or alternate work.

If you have satisfied each individual requirement and are left with a shortfall, you can round out the 150 program units by applying relevant graduate (G) and high (H) level electives; ideally these electives would be advanced subjects, building on the knowledge you already have.

Fundamental Engineering Systems Thinking

Complete the three (3) required fundamental Engineering Systems subjects

◯ ESD.83	Doctoral Seminar	*no substitutions*	12 units
◯ ESD.86	Models, Data & Inference for Socio-Technical Systems	◯ placed out	12 units
◯ ESD.87	Social Science Concepts & Methods	◯ placed out	12 units
Total Fundamental ES Units:	**≥ 36 units**		

Fundamental ES Placing-Out

If you have successfully demonstrated to the appropriate instructor your mastery of either ESD.86 or ESD.87 material (no substitutions will be accepted for ESD.83), then document it here. An important note, regardless of the path you take to master the material, you will be equally responsible for all the material covered in the fundamental ES subjects when you take your General Exams. Listening to (i.e. "auditing") the subject you have placed out of is recommended in most cases.

Subject	Instructor (print name)	Instructor Signature	Date
ESD.86			
ESD.87			

Applied Engineering Systems Thinking

For a minimum of 9 units, propose a subject you will take (have taken) that builds upon your fundamental ES knowledge and extends it to application. Applied ES subjects involve the application of systems thinking to some topic. Most ESD subjects fit within this category as do many courses outside of ESD that take holistic approaches to problems and examine the sociotechnical aspects of the topic.

Number	Instructor	Title	Units	Level	Taken Elsewhere † *(attach catalog listing)*
				◯ G or ◯ H	◯
				◯ G or ◯ H	◯
Total Applied ES Units		**≥ 9 units**			

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Domain/Context

Choose a domain like: aerospace, education, energy/environment, health care, human-systems, information technology, infrastructure, manufacturing, materials, telecommunications, transportation, safety, military systems, biology systems, etc.. Attach a short write-up of about two paragraphs on your proposed domain.

Domain	
One - Two Paragraph Description of Your Domain	

List at least three (3) advanced, doctoral-level subjects for a minimum of 30 units. Alternately, document practicum (internship, field work, etc.) or special subjects, supervised by an MIT instructor, you will take (have taken) in this domain for either part or all of the 30 units. Attach a Practicum / Special Subject Form for each practicum or special subject. Practicum and special subjects must be endorsed by your committee chair and submitted to the Academic Office, E40- 249, prior to registering for the subject.

	Subject				Practicum	
1	Number		◯ Taken at another institution † *(attach catalog listing)*	or	Number	◯ ESD.911 *(form attached)*
	Units				Start Date	
	Level	◯ G or ◯ H			End Date	
	Title				Supervisor	
	Instructor				Units	
2	Number		◯ Taken at another university † *(attach catalog listing)*	or	Number	◯ ESD.912 *(form attached)*
	Units				Start Date	
	Level	◯ G or ◯ H			End Date	
	Title				Supervisor	
	Instructor				Units	
3	Number		◯ Taken at another university † *(attach catalog listing)*	or	Number	◯ ESD.913 *(form attached)*
	Units				Start Date	
	Level	◯ G or ◯ H			End Date	
	Title				Supervisor	
	Instructor				Units	
Total Domain Units:		**≥ 30 units**				

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Methodology

Choose a methodology like: modeling & simulation, systems engineering analysis & evaluation, a management method like supply chain management, control theory, operations research methods, statistics, econometrics, decision analysis, social science methods, systems dynamics, etc.. Attach a short write-up of about two paragraphs on your proposed methodology.

Methodology	
One - Two Paragraph Description of Your Methodology	

List a sequence (if possible) of at least three (3) advanced, doctoral level subjects you will take (have taken) for a minimum of 30 units.

Number	Instructor	Title	Units	Level	Taken Elsewhere † *(attach catalog listing)*
				◯ G or ◯ H	◯
				◯ G or ◯ H	◯
				◯ G or ◯ H	◯
Total Methodology Units		**≥ 30 units**			

Electives

List sufficient additional graduate (G) or high (H) level electives that you will take (have taken) to reach your program minimum of 150 graduate units.

Number	Instructor	Title	Units	Level	Taken Elsewhere † *(attach catalog listing)*
				◯ G or ◯ H	◯
				◯ G or ◯ H	◯
				◯ G or ◯ H	◯
				◯ G or ◯ H	◯
				◯ G or ◯ H	◯
Total Elective Units		**to reach or exceed 150 program units**			

Total Program Units

program units ≥ 150

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Committee Formulation & Program Approval

Students should use their program form as a resource and, along with their ESD Faculty Committee Chair / Academic Advisor, be mindful of it while registering for each semester of their doctoral program. The form must be submitted to the Academic Office (E40-249) before the end of your second regular semester in the program (normally the deadline is May 10th). Subsequent changes must be initialed by your Committee Chair and then the Education Committee Chair. Note that the Committee documented below must have between three and five members, the chair must be an ESD faculty member, a minimum of two members must be MIT faculty, and a minimum of three members must hold **research-based** doctoral level degrees.

	Printed Name	Signature to Approve Program Form	Date
0. Student			
1. Committee Chair *an ESD Faculty Member*			
2. Committee Member *an MIT Faculty Member*			
3. Committee Member *holds a doctoral-level research-based degree*			
4. Committee Member			
5. Committee Member			
Education Committee Chair	Prof. Joseph Sussman		

† MIT units are worth the average number of hours spent in class, lab, and homework/preparation in a regular, 13-week semester. Hence, to calculate the number of MIT units alternate work is worth, start with the total number of hours and divide by 13. To convert between unit systems, check the course catalog of your former school for their formula. At most universities 1 unit = 3 MIT units = 3 hours of work per week in a regular semester.

To determine the level of a subject taken at another university, all graduate subjects intended exclusively for graduate and perhaps some very advanced undergraduate students are automatically at least “G” level. Graduate subjects with prerequisites are high “H” level. Graduate subjects intended exclusively for doctoral and some advanced master’s students may also be considered H level.