

Name: _____ MIT ID: _____

MIT Course (major): _____ Gender: _____

Expected Date for Award of S.B. (circle or fill-in): Feb. June Sept. Year: _____

Faculty Advisor (major): _____ Email: _____

Energy Studies Minor Advisor: _____ Email: _____

Student Term Address: _____

Student Phone: _____ Student Email: _____

Military Affiliation (if any) _____

T-shirt size: _____

STUDENT: Fill out this form by the end of your sophomore year, but no later than one full term before the term you expect to receive the S.B. degree. Meet with an ESM Advisor to plan your program of study and complete the application; bring a copy of your unofficial transcript (available free of charge at the Student Services Center, 11-120) to the meeting with your advisor. Give a copy of this transcript AND signed application to the ESM Advisor AND to the MIT Energy Initiative Education Office (E19-370D).

The ESM consists of required subjects from a core curriculum and 24 units of elective credit. You should outline your planned program for the ESM below. Any changes in this program must have prior approval of your ESM Advisor and must be entered on this application. Changes after application must be submitted directly to the ESM advisor AND the ESM Academic Coordinator in writing (can be via email), and include the signature of your advisor.

ENERGY STUDIES MINOR ADVISOR: To make changes, cross out deleted subjects. Date and initial all changes. For jointly listed classes, ensure the correct subject number is used on this form.

ENERGY STUDIES MINOR REQUIREMENTS

- (1) **Energy Studies Minor Core Curriculum Requirements: complete items a, b, c, and d below.**
 - a. Energy Science Foundations
 - b. Economics
 - c. Social Science Foundations of Energy
 - d. Energy Technology/Engineering in Context
- (2) **Energy Studies Minor Elective Requirement: Twenty-four (24) units from the list of approved Elective subjects (list of subjects on reverse; see website for most current listings).**

REQUIRED SUBJECTS PLANNED/COMPLETED

For jointly listed classes, enter the correct subject number (i.e., a Course 10 student might wish to enter 10.390[J] instead of 2.60[J]).

	Required Subject Name	Subject #/(Units)	Term planned/completed
Science		()	
Economics		()	
Social Science		()	
Technology/Engineering		()	

ELECTIVE SUBJECTS PLANNED/COMPLETED (24 units)

	Elective Subject Name	Subject #/(Units)	Term planned/completed
Elective 1		()	
Elective 2		()	
Elective 3 (if needed)		()	

Minor Advisor's Signature

Date of Approval

For official use only

Date Received:

Date Entered:

CORE CURRICULUM REQUIRED SUBJECTS *(choose one from each category)*

CATEGORY	FALL	SPRING
Energy Science Foundations	12.021 Earth Science, Energy, and the Environment, B. H. Hager	8.21 Physics of Energy, Jaffe, REST
Economics	14.01 Principles of Microeconomics, J. Gruber, HASS-S 15.0111 Economic Analysis for Business Decisions, J. Doyle (9 units)	14.01 Principles of Microeconomics, J. Harris, HASS-S
Social Science Foundations of Energy		14.44J/15.037J Energy Economics & Policy, C. Knittel, HASS-S 11.142 Geography of the Global Economy, A. Glasmeier, HASS-S 15.2191J/17.399J Global Energy: Politics, Markets, and Policy, V. Karplus ¹
Energy Technology/Engineering in Context	22.081J/2.650J/10.291J Introduction to Sustainable Energy, M. W. Golay 4.42J/1.044J/2.66J Fundamentals of Energy in Buildings, L. R. Glicksman,* REST 11.165 Urban Energy Systems and Policy, D. Hsu, HASS-S	2.60J/10.390J Fundamentals of Advanced Energy Conversion, A. F. Ghoniem & W. Green

APPROVED ELECTIVES *(Choose 24 units from the following, might have prerequisites; all are 12 units unless otherwise specified)*

FALL

- 1.018A[J]/7.30A[J], 12.031A[J] Fundamentals of Ecology I, O. Cordero, M. Follows *(6 units, first half of term)*
- 1.801[J]/11.021[J]/17.393[J] IDS.060 Environmental Law, Policy and Economics, N. Ashford & C. Caldart, **HASS-S**
- 2.005 Thermal-Fluids Engineering I, J. G. Brisson, J. Buongiorno, P. F. J. Lermusiaux, K. Varanasi
- 2.006 Thermal-Fluids Engineering II, Engineering I, J. G. Brisson, A. E. Hosoi, R. Karnik, G. H. McKinley
- 2.612 Marine Power and Propulsion, J. Harbour, M. S. Triantafyllou, R. S. McCord
- 2.627 Fundamentals of Photovoltaics, T. Buonassisi*
- 2.603 Fundamentals of Smart and Resilient Grids, K. Turistyn*
- 3.012 Fundamentals of Materials Science and Engineering, C. Ross, R. Jaramillo (15 units), **REST**
- 4.401 Environmental Technologies in Buildings, C. Reinhart
- 5.60 Thermodynamics and Kinetics M. Bawendi, A. Shalek, **REST**
- 6.007 Electromagnetic Energy: From Motors to Solar Cells, V. Bulovic, R. J. Ram, **REST**
- 6.131 Power Electronics Laboratory, S. B. Leeb
- 6.152[J]/3.155[J] Micro/Nano Processing Technology, L. F. Velasquez-Garcia, J. Michel
- 6.701 Introduction to Nanoelectronics, M. A. Baldo*
- 10.05 Foundational Analyses of Problems in Energy and the Environment, B. L. Trout
- 10.28 Chemical-Biological Engineering Laboratory, J. -F. Hamel (15 units)
- 10.302 Transport Processes, W. A. Tisdale, K. Manthiram
- 12.346[J]/IDS.062[J] Global Environmental Negotiations, N. E. Selin (6 units)*

SPRING

- 1.020 Principles of Energy and Water Sustainability, S. Amin
- 1.079 Rock-on-a-Chip: Microfluidic Technology for Visualization of Flow in Porous Media, R. Juanes
- 2.005 Thermal-Fluids Engineering I, J. G. Brisson, J. Buongiorno, P. F. J. Lermusiaux, K. Varanasi
- 2.006 Thermal-Fluids Engineering II, Engineering I, J. G. Brisson, A. E. Hosoi, R. Karnik, G. H. McKinley
- 2.570 Nano-to-Macro Transport Processes, G. Chen (not offered regularly)
- 2.813 Energy, Materials, and Manufacturing, T. G. Gutowski
- 3.003 Principles of Engineering Practice, L. Kimerling (9 units)
- 3.004 Principles of Engineering Practice, L. Kimerling (12 units)
- 3.022 Microstructural Evolution in Materials, Y. Chiang, G. Beach, J. Hu
- 3.18 Materials Science and Engineering of Clean Energy, H. Tuller & K. Van Vliet
- 3.154[J]/22.054[J] Materials Performance in Extreme Environments, Ballinger**
- 5.60 Thermodynamics and Kinetics J. Cao, S. Solomon, A. Willard, **REST**
- 6.061 Introduction to Electric Power Systems, J. L. Kirtley* (offered in alternating years)
- 10.04 A Philosophical History of Energy, B. L. Trout & A. Schulman
- 10.05 Foundational Analyses of Problems in Energy and the Environment, Trout
- 10.213 Chemical and Biological Engineering Thermodynamics, K. K. Gleason & H. D. Sikes
- 10.27 Energy Engineering Projects Laboratory, C. K. Colton, M. S. Strano, J. F. Hamel, W. A. Tisdale, G. Stephanopoulos (15 units)
- 10.426 Electrochemical Energy Systems, M. Z. Bazant
- 11.162 Politics of Energy and the Environment, **HASS-S****

16.001 Unified Engineering: Materials Structures, R. Radovitzky, D. L. Darmofal, **REST**

16.002 Unified Engineering: Signals and Systems, K. E. Willcox, D. L. Darmofal

17.051 Ethics of Energy Policy, various instructors, (not offered regularly), **HASS-S**

22.033 Nuclear Systems Design Project, Z. Hartwig, M. Bucci, K. Shirvan (15 units)

IAP/Summer

12.213 Alternate Energy Sources, Morgan (IAP, not offered regularly)

UROF (for pay in summer/for credit either term)²

12.340 Global Warming Science, various EAPS instructors

14.42 Environmental Policy and Economics, **HASS-S***

15.026[J]/12.348[J] Global Climate Change: Economics, Science, and Policy, R. G. Prinn (9 units)

16.003 Unified Engineering: Fluid Dynamics, D. L. Darmofal

16.004 Unified Engineering: Thermodynamics, Z. S. Spakovszky, D. L. Darmofal

22.06 Engineering of Nuclear Systems, E. Baglietto

EC.711[J]/2.651[J] D-Lab: Energy, S. L. Hsu

STS.032 Energy, Environment, and Society, W. San Martin, **HASS-H, CI-H***

APPROVED GRADUATE-LEVEL ELECTIVE ALTERNATIVE SUBJECTS (Requires permission of instructor, might have prerequisites)

FALL

2.63 Fundamentals of Smart and Resilient Grids, K. Turitsyn*

10.625[J]/2.625[J] Electrochemical Energy Conversion and Storage:

Fundamentals, Materials and Applications, Y. Shao-Horn*

15.366 Energy Ventures, W. Aulet, T. Hynes, F. O'Sullivan

16.715 Aerospace, Energy, and the Environment, S. Barrett

22.312 Engineering of Nuclear Reactors, J. Buongiorno

IDS.522 Mapping and Evaluating New Energy Technologies, J. Trancik

SPRING

1.692[J]/22.24[J] Ocean Wave Interaction with Ships and Offshore

Energy systems* P. D. Sclavounos

2.57 Nano-to-Macro Transport Processes, G. Chen, (not offered regularly)

5.00[J]/6.929[J]/10.579[J]/22.813[J] Energy Technology and Policy, from Principles to Practice, J. Deutch** (9 units)

6.334 Power Electronics, D. J. Perrault

6.695[J]/15.032[J]/IDS.505[J] Engineering, Economics and Regulation of the Electric Power Sector, I. Pérez-Arriaga

15.219[J]/17.399[J] Global Energy: Politics, Markets, and Policy, V. Karplus

15.S02 SSIM: Planning, Policy, and Technology for Energy Access in Developing Countries, I. Pérez-Arriaga & R. Stoner***

IDS.521 Energy Systems and Climate Change Mitigation, J. Trancik

¹ In 2017-2018 this class will be offered in the spring. Starting in 2018-2019, it will be offered in the fall.

² Energy UROFs, who work during the summer for pay, can continue to do research in the fall for credit, and that credit would count as an elective for the minor.

*Not offered AY 17-18

**Not offered AY 18-19

*** This is a "special subjects in management." The course number is not specific; only when this course number has this particular class does it count toward the Energy Studies Minor