EXPERIMENTAL STUDY GROUP (ES)

ESG Science Subjects

Biology

ES.7012 Introductory Biology
Prereq: None
U (Spring)
5-0-7 units. BIOLOGY
Credit cannot also be received for 7.012, 7.013, 7.014, 7.015, 7.016, ES.7013

Equivalent to 7.012; see 7.012 for description. Instruction provided through small, interactive classes. Limited to students in ESG.
P. Christie

ES.7013 Introductory Biology
Prereq: None
U (Spring)
5-0-7 units. BIOLOGY
Credit cannot also be received for 7.012, 7.013, 7.014, 7.015, 7.016, ES.7012

Equivalent to 7.013; see 7.013 for description. Instruction provided through small, interactive classes. Limited to students in ESG.
P. Christie

Chemistry

ES.5111 Principles of Chemical Science
Prereq: None
U (Fall)
5-0-7 units. CHEMISTRY
Credit cannot also be received for 3.091, 5.111, 5.112, CC.5111, ES.5112

Equivalent to 5.111; see 5.111 for description. Instruction provided through small, interactive classes taught by ESG staff. Limited to students in ESG.
P. Christie

ES.5112 Principles of Chemical Science
Prereq: None
U (Fall)
Not offered regularly; consult department
5-0-7 units. CHEMISTRY
Credit cannot also be received for 3.091, 5.111, 5.112, CC.5111, ES.5111

Equivalent to 5.112; see 5.112 for description. Instruction provided through small, interactive classes taught by ESG staff. Limited to students in ESG.
N. Boekelheide

Mathematics

ES.1801 Calculus
Prereq: None
U (Fall)
5-0-7 units. CALC I
Credit cannot also be received for 18.01, 18.01A, CC.1801, ES.181A

Equivalent to 18.01; see 18.01 for description. Instruction provided through small, interactive classes. Limited to students in ESG.
G. Stoy

ES.1802 Calculus
Prereq: Calculus I (GIR)
U (Fall, Spring)
5-0-7 units. CALC II
Credit cannot also be received for 18.02, 18.022, 18.02A, CC.1802, ES.182A

Equivalent to 18.02; see 18.02 for description. Instruction provided through small, interactive classes. Limited to students in ESG.
G. Stoy

ES.1803 Differential Equations
Prereq: None. *Coreq: Calculus II (GIR)*
U (Fall, Spring)
5-0-7 units. REST
Credit cannot also be received for 18.03, CC.1803

Equivalent to 18.03; see 18.03 for description. Instruction provided through small, interactive classes. Limited to students in ESG.
J. Orloff

ES.1806 Linear Algebra (New)
Prereq: Calculus II (GIR)
U (Spring)
4-0-8 units. REST
Credit cannot also be received for 6.C06[J], 18.06, 18.700, 18.C06[J]

Basic subject on matrix theory and linear algebra, emphasizing topics useful in other disciplines, including systems of equations, vector spaces, determinants, eigenvalues, singular value decomposition, and positive definite matrices. Applications to least-squares approximations, stability of differential equations, networks, Fourier transforms, and Markov processes. Uses linear algebra software. Compared with 18.700, more emphasis on matrix algorithms and applications. Enrollment limited to Experimental Study Group (ESG) students only.
A. Parzygnat

ES.181A Calculus
Prereq: Knowledge of differentiation and elementary integration
U (Fall; first half of term)
5-0-7 units. CALC I
Credit cannot also be received for 18.01, 18.01A, CC.1801, ES.1801

Equivalent to 18.01A; see 18.01A for description. Instruction provided through small, interactive classes. Limited to students in ESG.
J. Orloff

ES.182A Calculus
Prereq: Calculus I (GIR)
U (Fall, IAP)
5-0-7 units. CALC II
Credit cannot also be received for 18.02, 18.022, 18.02A, CC.1802, ES.1802

Equivalent to 18.02A; see 18.02A for description. Instruction provided through small, interactive classes. Limited to students in ESG.
J. Orloff

Physics

ES.801 Physics I
Prereq: None
U (Fall)
5-1-6 units. PHYSICS I
Credit cannot also be received for 8.01, 8.011, 8.012, 8.01L, ES.8012

Equivalent to 8.01; see 8.01 for description. Instruction provided through small, interactive classes. Limited to students in ESG.
A. Barrantes

ES.8012 Physics I
Prereq: None
U (Fall)
5-0-7 units. PHYSICS I
Credit cannot also be received for 8.01, 8.011, 8.012, 8.01L, ES.801

Equivalent to 8.012; see 8.012 for description. Limited to students in ESG.
P. Rebusco

ES.802 Physics II
Prereq: Calculus I (GIR) and Physics I (GIR)
U (Spring)
5-1-6 units. PHYSICS II
Credit cannot also be received for 8.02, 8.021, 8.022, ES.8022

Equivalent to 8.02; see 8.02 for description. Instruction done through small, interactive classes. Limited to students in ESG.
A. Barrantes

ES.8022 Physics II
Prereq: Physics I (GIR); *Coreq: Calculus II (GIR)*
U (Fall, Spring)
5-0-7 units. PHYSICS II
Credit cannot also be received for 8.02, 8.021, 8.022, ES.802

Equivalent to 8.022; see 8.022 for description. Students complete group projects. Some content is decided by students. Limited to students in ESG.
P. Rebusco

ESG Writing Program

ES.729[J] Engineering Communication in Context
Same subject as 21W.729[J]
Prereq: None
U (Fall)
Not offered regularly; consult department
3-1-8 units. HASS-E; CI-H

Introduces writing, graphics, meetings, reading, oral presentation, collaboration, and design as tools for product development. Students work in teams to conceive, design, prototype, and evaluate energy-related mechanical engineering products. Instruction focuses on communication tasks that are integral to the design process, including design notebooks, email, informal and formal presentations, meeting etiquette, literature searches, white papers, proposals, and reports. Other assignments address the cultural situation of engineers and engineering in the world at large. Limited to 18; preference to ESG students.
D. Custer

ESG HASS Subjects

ES.112 Philosophy of Love
Prereq: None
U (Spring)
Not offered regularly; consult department
4-0-8 units. HASS-H; CI-H
Credit cannot also be received for ES.9112

Explores the nature of love through works of philosophy, literature, film, poetry, and individual experience. Investigates the distinction among eros (desiring or appreciative love), philia (mutuality), and agape (love as pure giving). Students discuss ideas of love as a feeling, an action, a species of 'knowing someone,' or a way to give or take. Authors include Plato, Kant, Buber, D. H. Lawrence, Rumi, and Aristotle. Preference to students in ESG and Concourse.
L. Perlman

ES.113 Ancient Greek Philosophy and Mathematics
Prereq: None
U (Spring)
Not offered regularly; consult department
3-0-9 units. HASS-H; CI-H

Explores the relationship between ancient Greek philosophy and mathematics. Investigates how ideas of definition, reason, argument and proof, rationality/irrationality, number, quality and quantity, truth, and even the idea of an idea were shaped by the interplay of philosophic and mathematical inquiry. Examines how discovery of the incommensurability of magnitudes challenged the Greek presumption that the cosmos is fully understandable. Explores the influence of mathematics on ancient Greek ethical theories. Authors: Euclid, Plato, Aristotle, Nicomachus, Theon of Smyrna, Bacon, Descartes, Dedekind, and Newton. Preference to students in Concourse and ESG.
L. Perlman

ES.114 Non-violence as a Way of Life
Prereq: None
U (Fall)
Not offered regularly; consult department
3-0-9 units. HASS-H; CI-H
Credit cannot also be received for ES.9114

Addresses the philosophical question of what a non-violent life entails. Investigates its ethical dimensions and challenges, and considers whether we can derive a comprehensive moral theory from the principle of non-violence. Discusses the issues of lying, the duty to forgive, non-violent communication, the ethics of our relationship to anger, the possibility of loving enemies, and the ethics of punishment and rehabilitation. Includes readings from primary exponents of non-violence, such as Tolstoy, Gandhi and King.
L. Perlman

ES.9112 Philosophy of Love - MIT Prison Initiative
Prereq: None
U (Spring)
3-0-9 units. HASS-H; CI-H
Credit cannot also be received for ES.112

Explores the nature of love through works of philosophy, literature, film, poetry, and individual experience. Investigates the distinction among eros (desiring or appreciative love), philia (mutuality), and agape (love as pure giving). Students discuss ideas of love as a feeling, an action, a species of 'knowing someone,' or a way to give or take. Authors include Plato, Kant, Buber, D. H. Lawrence, Rumi, and Aristotle. Taught inside a secure Massachusetts correctional facility with a mix of MIT students and incarcerated students. Limited to 10.
L. Perlman

ES.9114 Non-violence as a Way of Life - MIT Prison Initiative
Prereq: None
U (Fall)
3-0-9 units. HASS-H; CI-H
Credit cannot also be received for ES.114

Addresses the philosophical question of what a non-violent life entails. Investigates its ethical dimensions and challenges, and considers whether we can derive a comprehensive moral theory from the principle of non-violence. Discusses the issues of lying, the duty to forgive, non-violent communication, the ethics of our relationship to anger, the possibility of loving enemies, and the ethics of punishment and rehabilitation. Includes readings from primary exponents of non-violence, such as Tolstoy, Gandhi and King. Taught inside a secure Massachusetts correctional facility with a mix of MIT students and incarcerated students. Limited to 10.
L. Perlman

ES.92 Authenticity - MIT Prison Initiative
Prereq: None
U (Fall, Spring)
3-0-3 units

Explores the question of how to live an authentic life, through works of western and eastern philosophy and contemporary psychology. Topics include emotions, anger, honesty, forgiveness, non-violent communication, conflict resolution, kindness and cruelty and compassion. Taught inside a secure Massachusetts correctional facility with a mix of MIT students and incarcerated students. Limited to 12.
L. Perlman

ESG Seminars

ES.010 Chemistry of Sports: Understanding How Exercise Affects Your Body
Prereq: None
U (Spring)
2-1-3 units

Students apply chemistry knowledge to physical fitness through the study of three sports: swimming, cycling, and running. Classroom component focuses on nutrition, exercise, anatomy, physiology, and the chemistry of supplements and sports equipment. Laboratory component focuses on training for and completion of triathlon competition. Students may earn up to 2 PE points during the term by attending supervised triathlon training workouts. Preference to students in ESG.
P. Christie, S. Lyons

ES.011 Kitchen Chemistry
Prereq: None
U (Spring)
Not offered regularly; consult department
2-1-3 units

An experimental and "hands-on" approach to applied chemistry in cooking. Students perform experiments to illustrate chemical principles, such as extraction, denaturation, and phase changes. Preference to students in ESG.
P. Christie

ES.100 An Introduction to Maker Skills
Prereq: None
U (Spring)
1-1-1 units

Introduction to making and use of MIT's maker spaces intended to build skills needed for designing, conducting, and completing experiments and design projects, such as may be encountered in undergraduate classwork and research activities. Includes maker space training (i.e., wood shop, digital fabrication, and electronics fabrication) and open-ended design projects, with work evenly divided between class, homework, and maker space activities. Limited to 12 by makerspace training and scheduling; priority given to ESG students.
D. Custer

ESG Teaching and Research

ES.200 ESG Undergraduate Teaching
Prereq: Permission of instructor
U (Fall)
2-0-4 units
Can be repeated for credit.

An opportunity to assist in the teaching of subjects in ESG in biology, chemistry, humanities and social sciences, mathematics, and physics. Student instructors may be involved in grading, running problemsolving sessions, or teaching classes depending on experience and interest. Qualified students may also develop and teach undergraduate seminars under the supervision of an appropriate faculty or staff member. Student instructors meet weekly with staff to discuss their teaching and cover a variety of topics related to effective teaching techniques. Limited to students in ESG.
P. Christie

ES.201 ESG Undergraduate Teaching
Prereq: Permission of instructor
U (Spring)
1-0-2 units
Can be repeated for credit.

An opportunity to assist in the teaching of subjects in ESG in biology, chemistry, humanities and social sciences, mathematics, and physics. Student instructors may be involved in grading, running problem solving sessions, or teaching classes depending on experience and interest. Qualified students may also develop and teach undergraduate seminars under the supervision of an appropriate faculty or staff member. Student instructors meet every other week with staff to discuss their teaching and cover a variety of topics related to effective teaching techniques. Limited to students in ESG.
G. Stoy

ES.210 ESG Independent Study
Prereq: Permission of instructor
U (Fall, IAP, Spring, Summer)
Units arranged [P/D/F]
Can be repeated for credit.

Opportunity for independent study under regular supervision by a staff member. Projects require prior approval, as well as a written proposal and a final report. Limited to students in ESG.
L. Royden

ES.UR Undergraduate Research in ESG
Prereq: None
U (Fall, IAP, Spring, Summer)
Units arranged [P/D/F]
Can be repeated for credit.

For students wishing to pursue undergraduate research opportunities in the Experimental Study Group. Limited to students in ESG.
L. Royden

ESG Special Subjects

ES.S10 Special Seminar in Science
Prereq: None
U (Spring)
Not offered regularly; consult department
Units arranged [P/D/F]
Can be repeated for credit.

Covers topics not included in the permanent curriculum. May not be used for GIR credit, but may be repeated for credit with permission of instructor. Preference to students in ESG.
Staff

ES.S11 Special Seminar in Science
Prereq: None
U (Spring)
Not offered regularly; consult department
Units arranged [P/D/F]
Can be repeated for credit.

Covers topics not included in the permanent curriculum. May not be used for GIR credit, but may be repeated for credit with permission of instructor. Preference to students in ESG.
Staff

ES.S20 Special Seminar in Mathematics
Prereq: None
U (Spring)
Not offered regularly; consult department
Units arranged [P/D/F]
Can be repeated for credit.

Covers topics not included in the permanent curriculum. May not be used for GIR credit, but may be repeated for credit with permission of instructor. Preference to students in ESG.
Staff

ES.S21 Special Seminar in Mathematics
Prereq: None
U (Fall, IAP, Spring)
Not offered regularly; consult department
Units arranged [P/D/F]
Can be repeated for credit.

Covers topics not included in the permanent curriculum. May not be used for GIR credit, but may be repeated for credit with permission of instructor. Preference to students in ESG.
Staff

ES.S30 Special Seminar in Engineering and Computer Science
Prereq: None
U (Spring)
Units arranged [P/D/F]
Can be repeated for credit.

Covers topics not included in the permanent curriculum. May not be used for GIR credit, but may be repeated for credit with permission of instructor. Preference to students in ESG.
Staff

ES.S31 Special Seminar in Engineering and Computer Science
Prereq: None
U (Fall)
Units arranged [P/D/F]
Can be repeated for credit.

Covers topics not included in the permanent curriculum. May not be used for GIR credit, but may be repeated for credit with permission of instructor. Preference to students in ESG.
Staff

ES.S40 Special Seminar in the Humanities
Prereq: None
U (Spring)
Units arranged [P/D/F]
Can be repeated for credit.

Covers topics not included in the permanent curriculum. May not be used for GIR credit, but may be repeated for credit with permission of instructor. Preference to students in ESG.
Staff

ES.S41 Special Seminar in the Humanities
Prereq: None
U (Fall, Spring)
Not offered regularly; consult department
Units arranged
Can be repeated for credit.

Covers topics not included in the permanent curriculum. May not be used for GIR credit, but may be repeated for credit with permission of instructor. Preference to students in ESG.
Staff

ES.S42 Special Seminar in the Humanities
Prereq: None
U (Fall, Spring)
Not offered regularly; consult department
Units arranged
Can be repeated for credit.

Covers topics not included in the permanent curriculum. May not be used for GIR credit, but may be repeated for credit with permission of instructor. Preference to students in ESG.
Staff

ES.S50 Special Seminar in the Arts
Prereq: None
U (Fall)
Not offered regularly; consult department
Units arranged [P/D/F]
Can be repeated for credit.

Covers topics not included in the permanent curriculum. May not be used for GIR credit, but may be repeated for credit with permission of instructor. Preference to students in ESG.
Staff

ES.S51 Special Seminar in the Arts
Prereq: None
U (Fall, IAP, Spring)
Not offered regularly; consult department
Units arranged [P/D/F]
Can be repeated for credit.

Covers topics not included in the permanent curriculum. May not be used for GIR credit, but may be repeated for credit with permission of instructor. Preference to students in ESG.
Staff

ES.S60 Special Seminar in Social Science
Prereq: None
U (Spring)
Not offered regularly; consult department
Units arranged [P/D/F]
Can be repeated for credit.

Covers topics not included in the permanent curriculum. May not be used for GIR credit, but may be repeated for credit with permission of instructor. Preference to students in ESG.
Staff

ES.S601 Special Topics in Computer Science
Prereq: None
U (Fall)
Not offered regularly; consult department
Units arranged

Covers topics not included in the permanent curriculum. Limited to 10. Preference given to ESG students.
P. Rebusco

ES.S602 Special Topics in Computer Science
Prereq: None
U (Spring)
Not offered regularly; consult department
Units arranged [P/D/F]

Covers topics not included in the permanent curriculum. Preference given to ESG students.
P. Rebusco

ES.S61 Special Seminar in Social Science
Prereq: None
U (Spring)
Not offered regularly; consult department
Units arranged [P/D/F]
Can be repeated for credit.

Covers topics not included in the permanent curriculum. May not be used for GIR credit, but may be repeated for credit with permission of instructor. Preference to students in ESG.
Staff

ES.S70 Special Seminar in Interdisciplinary Studies
Prereq: None
U (Fall, Spring)
Units arranged [P/D/F]
Can be repeated for credit.

Covers topics not included in the permanent curriculum. May not be used for GIR credit, but may be repeated for credit with permission of instructor. Preference to students in ESG.
Staff

ES.S71 Special Seminar in Interdisciplinary Studies
Prereq: None
U (Spring)
Units arranged [P/D/F]
Can be repeated for credit.

Covers topics not included in the permanent curriculum. May not be used for GIR credit, but may be repeated for credit with permission of instructor. Preference to students in ESG.
Staff

ES.S90 Special Studies in the MIT Initiative for Teaching Incarcerated Individuals
Prereq: None
U (Spring)
Units arranged [P/D/F]
Can be repeated for credit.

Seminar taught inside a secure Massachusetts correctional facility with a mix of MIT students and incarcerated students. Topics vary from year to year. Limited to 10.
Staff

ES.S91 Special Studies in the MIT Initiative for Teaching Incarcerated Individuals
Prereq: None
U (Spring)
Units arranged [P/D/F]
Can be repeated for credit.

Seminar taught inside a secure Massachusetts correctional facility with a mix of MIT students and incarcerated students. Topics vary from year to year. Limited to 10.
Staff

ES.S92 Special Studies in the MIT Initiative for Teaching Incarcerated Individuals
Prereq: None
U (Spring)
Units arranged [P/D/F]

Seminar taught inside a secure Massachusetts correctional facility with a mix of MIT students and incarcerated students. Topics vary from year to year. Limited to 10.
L. Perlman

ES.S93 Special Studies in the MIT Initiative for Teaching Incarcerated Individuals (New)
Prereq: None
U (Fall, Spring)
Units arranged [P/D/F]
Can be repeated for credit.

Seminar taught inside a secure Massachusetts correctional facility with a mix of MIT students and incarcerated students. Topics vary from year to year. Limited to 10.
L. Perlman