The Undergraduate Curriculum in Course III

The Course 3 S.B. includes an integrated set of Core subjects, a Thesis or an Internship, and four Restricted Electives chosen from a wide assortment.

The core subjects are:
Sophomore Fall
3.012 Fundamentals of Materials Science (15) REST
3.014 Materials Laboratory (12) CI-M
3.016 Mathematical Methods for Materials Scientists and Engineers (12)
alternative: 18.03 or 18.034, Differential equations (12)

Sophomore Spring
3.022 Microstructural Evolution in Materials (12)
3.024 Electronic, Optical and Magnetic Properties of Materials (12)

Junior or Senior
3.032 Mechanical Properties of Materials (12)   (Fall)
3.034 Organic and Biomaterials Chemistry (12)   (Fall)
3.042 Materials Project Laboratory (12) CI-M   (Fall and Spring)
3.044 Materials Processing (12)   (Spring)

Computation requirement:
3.021J   Introduction to Modeling and Simulation (12) REST or
1.00   Intro. to Computers and Eng. Problem Solving (12) REST or
6.001 Structure and Interpretation of Computer Programs (15) REST or
3.016 Mathematical Methods for Materials Scientists and Engineers (12)

The Coresubjects cover both theory (fundamentals) and practice (how these fundamentals are related to the real world), and include examples and applications. For instance, in the first semester you will see why viruses and proteins have such complex structures, why silicon is such a good material for making electronic devices, and why rubber is stretchy, to name just a few examples.

Our lab subjects take place in the new 2000 sq. ft. **Undergraduate Teaching Laboratory** located on the infinite corridor. It contains a range of equipment including facilities for biomaterials research, chemical synthesis and processing of materials, equipment for the characterization of electronic materials, an optical bench, and a scanning electron microscope. Walk by and take a look!
3.014 (labs) and 3.012 (lectures) are interleaved, so you can tie the lecture material directly into the labwork. 3.022, 3.024, 3.032 and 3.034 all have a lab component, and 3.042 is a project class.

Restricted electives
We have a wide range of electives and you can choose any four of them. There is no limitation on which you take, It is also often possible to substitute subjects outside course 3 by petition. The electives are grouped into these major areas of Materials Science and Engineering:

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Bio- and Polymeric Materials
Electronic Materials
Structural and Environmental Materials
Fundamental and Computational Materials Science

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Please see the Department's website, or contact us, if you would like advice on which subjects to take to satisfy your particular interests.

Internship or Thesis?
For the course 3 SB, you can either take an internship or a thesis.
The Thesis is typically 9-12 units based on on-campus, faculty-supervised research, conducted during the senior year.
The Internship option consists of two summer internships during which you work at a company (for pay), and write up your work in two separate reports. The second of these reports is submitted in lieu of a Thesis. It is essential that you declare your interest in the Internship option early in your sophomore year to allow time to arrange placement.

If you are a freshman interested in course 3: For your spring semester, you might like to take 3.094, **Materials in Human Experience**, 3.001J, **Colossal Failures in Engineering**, or 3.002J, **Introduction to Bioengineering**. For math, you can take 18.03 in the freshman year or 3.016 as a sophomore in the fall.

What is Course 3A?
Course 3A is a more flexible curriculum than course 3, in which a larger number of elective choices is available. For instance, some students may wish to take more biology and chemistry subjects in preparation for medical school, or more management subjects prior to entering an MBA program.

3C, The Archaeology and Materials degree. For those interested in 3C, an example of a roadmap is given below.

Examples of Roadmaps

One option for Course 3

	Fall	Spring
Freshman[1]	3.091 Chemistry, 8.01 Physics, 18.01 Calculus, HASS	7.013 Biology, 8.02 Physics, 18.02 Calculus, HASS
Sophomore	3.012, 3.014, 3.016 HASS	3.022, 3.024, elective or 3.021J HASS
Junior	3.032, 3.034, HASS, Restricted elective	3.042, 3.044, HASS, Restricted elective
Senior	2 Restricted electives, elective, HASS	2 electives, Thesis*, HASS

*Instead of Thesis, you can take an internship in sophomore and junior summers.

Another option for Course 3

	Fall	Spring
Freshman[1]	3.091 Chemistry, 8.01 Physics, 18.02 Calculus, HASS	7.013 Biology, 8.02 Physics, 18.03 Diff. Eqs., HASS
Sophomore	3.012, 3.014, elective, HASS	3.022, 3.024, elective, HASS
Junior	3.032, 3.034, HASS, Restricted elective	3.042, 3.044, HASS, Restricted elective
Senior	2 Restricted electives, elective, HASS	2 electives, Thesis*, HASS

*Instead of Thesis, you can take an internship in sophomore and junior summers.

An example for Course 3C

	Fall	Spring
Freshman[1]	3.091 Chemistry, 8.01 Physics, 18.01 Calculus, HASS	7.013 Biology, 8.02 Physics, 18.02 Calculus, HASS
Sophomore	3.012, 3.014, 3.016 3.986	3.022, 3.987, 3.985J, 12.001
Junior	3.032*, 3.990, 21A.100, Elective	12.110 or 12.119, HASS Restricted elective, 3.021J
Senior	Restricted elective, 2 electives, HASS	2 electives, Thesis, HASS

*alternative: take 3.044 in spring

If you have any questions on the new curriculum, please contact Prof. Caroline Ross.

Bachelor of Science in Materials Science and Engineering/Course III

General Institute Requirements (GIRs)	*Subjects*
Science Requirement	6
Humanities, Arts and Social Sciences Requirement	8
Restricted Electives in Science and Technology (REST) Requirement (can be satisfied by 3.012 and 3.021J)	2
Laboratory Requirement (can be satisfied by 3.014)	1
Total GIR Subjects Required for S.B. Degree	*17*

Communication Requirement: Two CI-M and Two CI-H subjects

PLUS   Departmental Program   **Units**

Subject names below are followed by credit units, and by prerequisites if any

Required subjects   **128-138**

3.012   Fundamentals of Materials Science and Engineering, 15, REST
3.014   Materials Laboratory, 12, LAB, CI-M
3.016   Mathematical Methods for Materials Scientists and Engineers[3], 12, 18.02
OR 18.03 Differential Equations, 12, 18.02, REST
OR 18.034, Differential Equations, 12, 18.02, REST
3.022   Microstructural Evolution in Materials, 12, 3.012
3.024   Electronic, Optical and Magnetic Properties of Materials, 12, 3.012
3.021J   Introduction to Modeling and Simulation[3], 12, 3.016 or 18.03*, REST
OR 1.00   Intro. to computers and engineering problem solving, 12, 18.01, REST
OR 6.001, Structure and interpretation of computer programs, 15, REST
OR 3.016 Mathematical Methods for Materials Scientists and Engineers, 12, 18.02
3.032   Mechanical Properties of Materials, 12, 3.016*
3.034   Organic and Biomaterials Chemistry, 12, 3.091*
3.042   Materials Project Laboratory, 12, 3.012, 3.014, CI-M
3.044   Materials Processing, 12, 3.022, 3.016*
3.Th.U   Thesis, 9[1], CI-M
OR 3.930 Industrial Practice, 6, plus 3.931 Industrial Practice, 6, 3.930, CI-M

Restricted Electives[2] Select four from the following: **48**

3.069   Ceramics Processing, 12, 3.044
3.07   Introduction to Ceramics, 12, 3.012
3.14   Physical Metallurgy, 12, 3.012, 3.022, 3.032
3.080   Economic & Environmental Materials Selection 12, 3.012, 3.014, 3.022, 3.024
3.048   Advanced Materials Processing 12, 3.022, 3.044
3.15   Electrical, Optical and Magnetic Materials and Devices, 12, 3.024
3.153   Nanoscale Materials, 12, 3.024
3.155J   Microelectronics Processing Technology, 12, CI-M
3.063   Polymer Physics, 12, 3.012
3.064   Polymer Engineering, 12, 3.032, 3.044
3.051J   Materials for Biomedical Applications, 12, 3.091*, 7.012*, 3.012
3.052   Nanomechanics of Materials and Biomaterials, 12, 3.032
3.053J   Molecular, Cellular and Tissue Biomechanics, (12), 18.03 or 3.016, 7.012
3.046   Thermodynamics of Materials, 12, 3.016 or 18.03, REST
3.073   Diffraction and structure 12, 3.024
3.072   Symmetry, structure and tensor properties of materials 12, 3.07

Departmental Program units that also satisfy the GIRs   **(39)**
Unrestricted Electives   **48**
Total Units beyond the GIRs Required for S.B. Degree   **185-195**

No subject can be counted both as part of the 17-subject GIRs and as part of the 185-188 units required beyond the GIRs. Every subject in the student's departmental program will count towards one or the other, but not both.   [1]Students may elect 9 – 12 units   [2]Substitution of similar subjects may be permitted by petition. [3]Can instead count as restricted electives *Alternative prerequisites are listed in the description.

Bachelor of Science in Archaeology and Materials as recommended by the Department of Materials Science and Engineering/Course IIIC

General Institute Requirements (GIRs)	Subjects
Laboratory Requirement (can be satisfied by 3.014 or 12.119)	1
Restricted Electives in Science and Technology (REST) Requirement (can be satisfied by 3.012, 3.021J or 12.001)	2
Science Requirement	6
Humanities, Arts and Social Sciences Requirement (can be satisfied by 3.986, 3.987, 3.985J, 21A.100 and 3.982 or 3.983 or 3.988)	8
Total GIR Subjects Required for S.B. Degree	*17*

Communication Requirement: Two CI-M and Two CI-H subjects

PLUS *Departmental Program*   *Units*

Subject names below are followed by credit units, and by prerequisites if any

Required subjects   **152-162**

3.012   Fundamentals of Materials Science, 15, REST
3.014   Materials Laboratory, 12, LAB, CI-M
3.016   Mathematical Methods for Materials Scientists and Engineers, 12, 18.02
OR 18.03, Differential Equations, 12, 18.02, REST
OR 18.034, Differential Equations, 12, 18.02, REST
3.022   Microstructural Evolution in Materials, 12, 3.012
3.021J   Introduction to Modeling and Simulation, 12, 3.016 or 18.03*, REST
OR 1.00   Intro. to computers and engineering problem solving, 12, 18.01, REST
OR 6.001, Structure and interpretation of computer programs, 15, REST
OR 3.016 Mathematical Methods for Materials Scientists and Engineers, 12, 18.02
3.032   Mechanical Properties of Materials, 12, 3.016*
OR 3.044 Materials Processing, 12, 3.022, 3.016*
3.Th.U   Thesis[1], 9, CI-M
3.986   The Human Past: Introduction to Archaeology, 12, HASS-D
3.987   Human Origins and Evolution, 9, HASS
3.985J   Archaeological Science, 9, HASS, 3.091*
3.990   Sem. in Archaeological Method & Theory,6,3.986,3.985J, 21A.100
12.001   Introduction to Geology, 12, REST
12.110   Sedimentary Geology, 12, 12.001
OR 12.119 Analytical Techniques for studying Environmental and Geologic Samples, 12, LAB
21A.100   Introduction to Anthropology, 12, HASS-D

Restricted Electives[2]   **21-24**
One subject from the following list:
3.069   Ceramics Processing, 12, 3.044
3.07   Introduction to Ceramics, 12, 3.012
3.14   Physical Metallurgy, 12, 3.012, 3.022, 3.032
3.051J   Materials for Biomedical Applications, 12, 3.091*, 7.012*, 3.012
3.052   Nanomechanics of Materials and Biomaterials, 12, 3.032
One subject from the following list:
3.982   The Ancient Andean World, 9, HASS
3.983   Ancient Mesoamerican Civilization, 9, HASS
3.984   Materials in Ancient Societies, 12
3.988   Africa – Past and Present, 9, HASS

Departmental Program units that also satisfy the GIRs	**(90)**
Unrestricted Electives	**97**
Total Units beyond the GIRs Required for S.B. Degree	**180-193**

[1]Students may elect 9 – 12 units   [2]Substitution of similar subjects may be permitted by petition
*Alternative prerequisites are listed in the subject description