UC SANTA BARBARA
engineering

UC SANTA BARBARA
MATERIALS

FIVE YEAR COMBINED
BS-ENGINEERING /
MS-MATERIALS PROGRAM

Fall 2020

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CONTACT INFORMATION

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***Important**: There will be an informational session for all students during the Spring Quarter of their sophomore year. Please notify your departmental undergraduate advisor staff of your interest in attending this session. If afterward you are interested in joining the program you must (i) notify your Undergraduate Department Advisor and the Materials Department Graduate Office of your interest before the end of the Spring Quarter of your Sophomore Year, (ii) enroll in Matrl 100A for the Fall quarter of your Junior year, and (iii) arrange a meeting with the BS/MS Program Advisor for your Engineering Major during your Junior year to start planning your academic program. Students who do not comply with this requirement will find it difficult to join the program later on.*

FACULTY IN THE MATERIALS DEPARTMENT

	Professor	Joint Appt.	Area
*	Michael L. Chabinyc (Chair)	—	Macro/Bio/Electr./Photonic
*	Christopher M. Bates	Chem E	Macro/Biomolecular
	Matthew R. Begley	ME	Structural
	Irene J. Beyerlein	ME	Structural
	John Bowers (IEE Director, AIM Photonics)	ECE	Electronic/Photonic
*	Raphaële Clément		Functional/Quantum
*	Steven P. DenBaars (SSLEEC Co-director)	ECE	Electronic/Photonic
*	Daniel S. Gianola	—	Structural
*	John W. Harter	—	Functional/Quantum
*	Craig Hawker (CNSI/DMI Director)	Chem	Macro/Biomolecular
*	Carlos G. Levi	ME	Structural
*	Robert M. McMeeking	ME	Structural
*	Shuji Nakamura (SSLEEC Co-director)	ECE	Electronic/Photonic
	Chris Palmstrøm	ECE	Electronic/Photonic
*	Angela Pitenis		Macro/Biomolecular
	Philip A. Pincus	Phys/BMSE	Macro/Biomolecular
*	Tresa M. Pollock	—	Structural
*	Cyrus R. Safinya	Phys/BMSE	Macro/Biomolecular
*	Omar Saleh	BMSE	Macro/Biomolecular
*	Ram Seshadri (MRL Director)	Chem	Functional/Quantum
	Rachel A. Segalman	Chem E	Macro/Biomolecular
*	James S. Speck (ICWBS Director)	—	Electronic/Photonic
*	Susanne Stemmer	—	Funct./Quant./Electr./Photonic
	Galen D. Stucky	Chem	Funct./Quant./Electronic
*	Chris Van de Walle	—	Electronic/Photonic
*	Anton Van der Ven (Dept. Grad. Advisor)	—	Structural/Funct./Quantum
	Claude Weisbuch	—	Electronic/Photonic
*	Stephen D. Wilson (Associate Chair)	—	Functional/Quantum
*	Frank W. Zok (COEC Director)	—	Structural

** Majority appointment in Materials*

Please see Departmental Website (www.materials.ucsb.edu) for Emeriti and Affiliated Faculty.

ABOUT THE PROGRAM

Why is knowledge of Materials important to Engineers?

- Materials are the substances of which things are made and, hence, their properties are critical to the performance of the components and systems constituted by them.
- From an Engineering perspective, *materials allow the embodiment of ideas to solve societal problems and to enhance our lives*. Indeed, almost every aspect of modern life is touched by a technology made possible by advances in materials. For example, it is difficult to envision the revolution in high speed computing and telecommunications without semiconductors and optical fibers, or the modern jet engine without high temperature superalloys, or advanced CAT scanners without superconducting magnets and ceramic scintillators, etc.
- Materials are often the enabling element of technological progress in all major industries in which engineers find employment, e.g. electronics, communications and information, biotechnology, aerospace, energy, transportation, environmental control, food processing, etc. As such, knowledge of materials has always been an asset for the practicing engineer and is likely to become even more important for professional success as the pace of technological change increases.
- The study of materials is predicated on the relationship between the *properties* of a material, which determine its *performance* in service, and its *internal structure*, i.e. the way in which the material is assembled at all relevant length scales, from the atoms up to the application. In turn, the structure may be modified by changes in the chemical composition and the *processing* conditions, allowing the engineer to tailor the material for specific performance goals. Materials is a dynamic and eminently interdisciplinary field, with strong elements of both Science and Engineering, which provides understanding of why materials behave the way they do and thus enables engineers to better harness their potential in developing new technologies.

Is this program for you?

- This program is designed for students who wish to enhance their undergraduate education in one of the classical engineering disciplines by adding a strong knowledge base in the understanding of materials behavior, of their synthesis and processing, and of their applications in modern technology.
- The program allows outstanding students to concurrently pursue a Bachelor of Science degree in Chemical, Electrical, or Mechanical Engineering, and a Master of Science degree in Materials, and to complete graduation requirements for both degrees within 5 years. (See appendix for timelines and worksheets for each discipline.). There is also a 5 year program combining a BS in Chemistry with an MS in Materials (separate handbook).
- The graduates of this program retain the breadth and flexibility inherent in the mainstream Engineering disciplines while their specialized knowledge of engineering materials will give them a competitive edge in the high technology industry.
- The program capitalizes on the emergence of UCSB as an internationally renowned institution in Materials research and education. The students involved will interact with faculty working at the cutting edge of technology in a broad range of modern materials, benefiting from their advice and expertise in areas critical to future industrial development.

ADMISSION PROCESS

BS/MS Information Session

An informational meeting is typically held during the Spring Quarter for all sophomore students who may be interested in applying to the BS/MS program. After that meeting students interested in the program must inform their Undergraduate Department Advisor and the Materials Graduate Office of their intention to pursue the Materials BS/MS program. Students must consult with these offices about admission procedures and the structure of the program.

BS/MS Program Advisors

Prior to the start of their third year (or in the quarter when the student achieves Junior status), candidates should arrange for a meeting with one of the Materials Department's BS/MS advisors (below) to discuss their interests, academic goals, and program requirements:

Chemical Engineering students ..... Professor Rachel Segalman
Electrical Engineering students ..... Professor Chris Palmstrøm
Mechanical Engineering students..... Professor Carlos G. Levi

The BS/MS advisors help students plan their Junior and Senior year studies, in coordination with the student's own departmental undergraduate program advisor, and also assist them during the application process for the program. In preparing their academic plan, all students interested in this program must plan on taking MATRL 100ABC during the Junior year (no exceptions).

Who is eligible to apply?

Applicants must meet the following requirements in order to qualify for admission:

- Eligible applicants are in their third year.
- A minimum overall GPA of 3.2 at the end of the third year, with a 3.5 minimum GPA in Engineering courses.
- Receive a B minimum in each of the undergraduate Materials core courses (MATRL 100A, MATRL 100B[1] and MATRL 100C).[2] Grades in Physics, Chemistry and Math are particularly important, as are grades in core courses within the discipline.
- A GRE score with a minimum of 85% in the Quantitative portion and performance in the verbal and writing sections comparable to the Materials Department entry class in the previous academic year.

While some exceptions might be made for special circumstances, students must realize that they will be taking courses with Ph.D. oriented students from a very competitive pool in the graduate part of the program, so they must be able to perform academically well in that environment.

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[1] Chem E and Mech E students are **required** to complete **either** MATRL 101 **or** 100B as part of their upper division major requirements, but can only count one of them for credit toward graduation. Students in the BS/MS program **must** take 100B, not 101.

[2] Chem E and Mech E majors may count 100A and 100C toward their technical elective requirements for the BS regardless of whether they decide to pursue the BS/MS program. ECE majors may count 100A,B, and C toward their departmental elective requirements. Students must get prior approval from their undergraduate departmental advisor before taking these courses for credit.

Departmental Internal Application

The student must submit a complete application for admission to the MS program in Materials under Plan 2, **no later than the last working day of July** (after the end of Spring quarter of their third year). The application must be submitted electronically to the Materials Graduate Program Coordinator (academic@engineering.ucsb.edu), and must include:

- A Statement of Purpose, a Statement of Personal Achievements, and a Resume or CV.
- An official copy of transcripts from UCSB and all other post-secondary institutions attended.
- Three letters of recommendation from people able to judge the potential of the student for graduate studies. These people should ideally be faculty at UCSB or other higher education institutions who are familiar with the student's academic performance. Letters from internship supervisors are acceptable as long as these supervisors have advanced degrees (Ph.D. or M.Sc) in a science or engineering discipline. Letters from graduate students who may have mentored the student during an internship are discouraged. Letters of recommendation should be mailed by post or electronic means directly by the recommender to the Materials Graduate Program Coordinator by the application deadline.
- Official GRE scores by the application deadline (last working day in July). Request that the official scores be sent to UCSB—Institution code 4835. GRE scores must be submitted by the application deadline (the last working day of July) [3] to allow the admissions committee enough time to evaluate the application. It is strongly recommended that students prepare for the GRE and take it early, in case they need to retake it to improve their scores.
- A proposed BS/MS study plan. The appropriate Undergraduate Department Advisor must endorse the BS portion after it has been approved by a designated faculty advisor. The BS portion of the plan **must** include the required 6 units of approved departmental elective courses with materials content. MATRL 100A, B, and C **do not** count toward those 6 units (See Table II).

Details on the application requirements can be found in the departmental application packet. You may download the departmental application from the Materials Department website. Direct any questions about the application process to the Graduate Program Coordinator at academic@engineering.ucsb.edu.

IMPLEMENTATION OF THE PROGRAM

Senior Year

- Notification of an admissions decision before the start of the Fall quarter of the Senior year.
- You must select an **emphasis** (Electronic/Photonic, Functional/Quantum , Macro-/Bio-molecular or Structural) and an MS advisor within the Materials Department (usually different from the BS/MS advisors listed above). The MS advisor will help the student prepare his/her MS study plan and the engineering report required for graduation under Plan 2 (see below).

[3] GRE requirements may be postponed under situations where in-person testing may be suspended because of a health emergency, as in the present Covid-19 situation. Please consult with the Graduate Program Coordinator on the procedure to satisfy the GRE requirement under these circumstances.

- Submit a proposed MS study plan before the end of the Fall quarter. You must submit this plan together with your approved undergraduate departmental elective form[4] or the study plan you intend to use for graduation from your BS major (as appropriate to your department) to the Materials Graduate Office.
- The MS study plan must include an individualized major course sequence consisting of 3 graduate courses within the emphasis selected (Electronic/Photonic, Functional/Quantum, Macro/Bio or Structural), and approximately 7-8 graduate elective courses. The major course sequence can be taken over the fourth and fifth year of the program.
- Take at least **one** Materials graduate course per quarter to count towards the MS degree from the list of graduate elective courses in Table IIIA-D. You are allowed to take courses outside your chosen area of emphasis with prior approval of your MS advisor and the departmental Materials Graduate Advisor. However, you must complete at least 42 units of Materials courses to satisfy graduation requirements for the MS.
- You are **required** to take a minimum of 6 units of approved undergraduate elective courses with Materials content, to be counted as technical/departmental electives toward your BS degree. The courses will be selected from Table II.[5]
- A final MS study plan must be submitted before the end of Spring quarter. These approvals are required before a BS/MS student is eligible to advance to graduate status (see below) by the start of Fall quarter of the Graduate (5^{th}) year.

Fifth Year

- Take remaining courses, if any, to complete the approved major course sequence specified in the study plan.
- Take remaining undergraduate courses for your BS degree, if any.
- Take remaining Materials graduate electives. Up to 6 units of approved undergraduate courses from Table II, not applied already toward the BS degree may be taken as preparation or complement to graduate courses in the MS program (Optional).
- Take one (and only one) unit of MATRL 290 (Research Group Studies) per quarter, for a total of 3 units during the MS year. Students must register for MATRL 290 under their MS advisor's code, in order to receive credit for these units. Students must check with their MS advisor the appropriate requirements for earning the credit in MATRL 290, which could involve attending research group meetings and/or area seminars (e.g. the Structural Materials Seminar for students in this emphasis).
- Take 3-6 units of MATRL 596 (Direct Reading and Research). Students must register for these units under their MS advisor's code, as soon as they start working on preparation for

[4] Students can include on their undergraduate elective forms, MATRL 100 A, B, and C (students may only count either 101 or 100B toward their major) as well as the required 6 units of undergraduate electives with Materials content selected from the list in Table II, in order to satisfy the requirements of their individual major curricula.

[5] Students are allowed to take undergraduate elective courses outside the approved elective list (Table II) for their tracks/emphases, with prior approval from their BS/MS advisor and their undergraduate departmental advisor.

their Engineering Report, but not before. Students may have to present evidence of progress to receive a satisfactory grade in the quarter(s) in which these units are taken if their Engineering Report is not submitted by the end of the quarter in which the units are completed.

- Submit an Engineering Report based on the MATRL 596 work by the end of Spring quarter.

Students in this program are neither required nor eligible to be teaching assistants, and thus are not eligible to receive credit for teaching assistant practicum (MATRL 501).

MS DEGREE IN MATERIALS – PLAN 2

All students in the BS/MS program **must follow Plan 2** for the M.S. degree.

Students in this plan are required to:

1) Complete 42 units of coursework including:
   a) 33 units of formal coursework of which a minimum of **27** units must be approved 200-289 level courses comprising of major sequence and elective courses.
      (i) Students are advised to take no more than 3 courses outside of the Materials Department
   b) at most 6 units of approved advanced undergraduate courses not used already for credit toward a previous degree (optional)[6]
   c) no fewer than 3 and no more than 6 units of MATRL 596 (Reading and Research),
   d) 3 units of MATRL 290 (Research Group Studies), and

2) Submit an acceptable Engineering Report based on the MATRL 596 work. A committee of two faculty members, including the student's advisor, must approve the report. At least one member of the committee must have a majority appointment in the Materials department, preferably on the student's selected MS major. The committee must be approved by the Materials department graduate advisor in advance.

ADVANCING TO GRADUATE STATUS

This change in status must happen prior to the beginning of the Fall quarter of the fifth year in order to satisfy the minimum residency requirements (3 quarters) of the Graduate Division. BS/MS students are therefore advised to change from undergraduate to graduate status as soon as they complete the required undergraduate coursework and units (180+). Once a BS/MS student reaches graduate status, he/she can begin to take the rest of the graduate unit requirements. Students should be aware that the change in status would prompt the registrar to charge Graduate fees for courses taken during this time.

In order to advance to MS (Graduate) status, students must:

[6] Please note these undergraduate units are different from the minimum of 6 undergraduate electives with Materials content required toward the BS, to be taken during the senior year. Students are not required to take any undergraduate units toward their MS, but they are given the opportunity to count up to 6 units of courses that may be preparatory for some courses in the Materials MS.

- Have final MS study plan approved by their MS advisor and the Department Graduate Advisor. The approved study plan must be submitted to the College of Engineering Undergraduate Office by May 1st and student must sign the Advancement Request Memo.
- Submit the UCSB Graduate Online application by May 15th. The student will receive an email from the Graduate Division with instructions for completing and submitting the application: www.graddiv.ucsb.edu/eapp.
- Officially accept your offer of admission by submitting a Statement to Intent to Register (SIR) through the application by June 15th

Note: In addition to fulfilling the requirements of the BS/MS program discussed above, students must ensure that they follow all the requirements of their individual undergraduate curricula for the Bachelor of Science in Chemical, Electrical or Mechanical Engineering. Tables are provided in the Appendix to help students in each curriculum understand how they can plan their BS/MS program to satisfy both the BS and the MS requirements within five years. At the end of a BS/MS student's senior year he/she has the option of filling out a BS graduation form and leaving the program with a BS degree, assuming all requirements for the BS have been met.

ENGINEERING REPORT

The student's advisor will assign the student a specific topic relevant to his/her emphasis area. The student will research the literature on the assigned topic, identify key outstanding issues and/or research opportunities, propose ideas on how to address these issues and/or exploit the opportunities. The student is expected to prepare a short document (10 pages of text maximum, plus figures and suitable references after the text) summarizing his/her findings and ideas.

Formatting Guidelines

- 12 pt font with 1" margins on all sides, and single or maximum 1.5 lines spacing.
- The text should comprise 10 pages maximum, not counting the cover page.
- References and figures are to be placed after the text and are not included in the 10 pages of text specified for the corresponding document.
- Ask the Graduate Program Coordinator for the formatting guidelines of the cover page

Report Committee

A committee of two faculty members, including the student's advisor, must approve the report. At least one member of the committee must have a majority appointment in the Materials department, preferably on the student's selected MS major. The committee must be approved by the Materials department graduate advisor in advance.

TABLE I. TIMELINE FOR THE BS-ENGINEERING/MS-MATERIALS PROGRAM

Year:	Summary of Events:
Second	▪ Spring quarter: Attend BS/MS information session ▪ Notification to the Undergraduate Department Office of student's interest in BS/MS program ▪ Meeting with the Materials Department Graduate Program Coordinator to ensure all initial steps have been followed properly.
Third	▪ Meeting with the appropriate faculty BS/MS advisor corresponding to the student's BS department. ▪ Fall: Matrl 100A; Winter: Matrl 100B; Spring: Matrl 100C ▪ Winter: Prepare for, and take the GRE. ▪ Spring: Submission of application by the last working day of July, to the Materials Graduate Program Coordinator for admission to the BS/MS Program. ▪ Summer: Departmental admission decision by last working day in August.
Fourth	▪ Submit proposed MS study plan by the end of Fall quarter -must include individualized major course sequence. ▪ 6 units of approved undergraduate electives with Materials content, to be counted toward the BS degree (Table II). ▪ Take one Graduate course each quarter ▪ Select an advisor no later than spring quarter and notify the Materials Department. He/she must help you prepare and endorse your final MS study plan. ▪ Have final MS study plan approved by their MS advisor and the Department Graduate Advisor. The approved study plan must be submitted to the College of Engineering Undergraduate Office by May 1st and student must sign the Advancement Request Memo. ▪ Submit the Graduate Division electronic application by May 15th ▪ Advance to graduate status at the end of Spring quarter
Fifth	▪ Remaining Undergraduate Courses, if any. ▪ Remaining Graduate electives and remaining core sequence courses. ▪ Up to 6 units of additional undergraduate courses not applied already toward the BS degree may be taken in fourth or fifth year as preparation or complement to graduate courses in the MS program. ▪ Research Group Studies, MATRL 290 (3 units, one unit per quarter) ▪ Directed Reading and Research, MATRL 596 (3-6 units) ▪ Deliver Engineering Report based on Directed Reading and Research studies by the end of the Spring quarter. Project must be approved by their committee in time for student to file for graduation during the Spring quarter.

APPENDIX A:
APPROVED COURSES

TABLE II. APPROVED UNDERGRADUATE COURSES

Fall	U	Winter	U	Spring	U
Undergraduate Core					
MATRL 100A **Structure & Properties I**	3	**MATRL 100B** **Structure & Properties II**	3	**MATRL 100C** **Structural Evolution**	3
Undergraduate Electives					
MATRL/ME 185 Materials in Engineering	3	MATRL/PHYS 135 Biophysics and Biomolecular Materials	3	ME/ECE 141B: MEMS Semiconductor Processing and Device Characterization	4
		MATRL/CH E 160 Introduction to Polymer Science	3	CH E 126 Non-Newtonian Fluids, Soft Materials and Chemical Products	3
ECE/MATRL 162A* Quantum Description of Electronic Materials	4	ECE/MATRL 162B Fundamentals of the Solid State	4	ECE 162C Optoelectronic Materials and Devices	4
ME 167 Structural Analysis	3	ME 125FA Failure Analysis	3	ME 166 Advanced Strength of Materials	3
		MATRL/ME 186A Manufacturing and Materials	3	MATRL/ME 186B Introduction to Additive Manufacturing	3
				ME 125IB Failure- Why Defects Are Essential to Material Science	3

Any of the courses listed above may be taken by BS/MS candidates in any department to satisfy their undergraduate technical/departmental elective requirements with prior approval of the departmental undergraduate advisor. Please check with individual departments as course scheduling may change from year to year and some courses may not be offered every year.

Courses must have materials science or materials engineering content. Check for offerings that may not be in this table. You may petition as long as the course is clearly related to Materials. Your petition must be endorsed by your graduate and undergraduate advisors and approved by the academic affairs committee in Materials.

*Note: this course is typically a background course for the Electronic/Photonic Materials graduate sequence (see Table IIIA)

TABLE III-A. ELECTRONIC/PHOTONIC MATERIALS

Please note course offerings may change from year to year.

Course Number	Course Title	Units
	Major Sequence Courses:	
206A-B	Fundamentals of Electronic Solids I, II	4
209A	Crystallography and Diffraction Fundamentals	3
211A	Engineering Quantum Mechanics	4
215A-B-C	Semiconductor Device Processing (215A is *required for authorization to work independently in clean room.*)	4
268A-B	Semiconductor Lasers I, II	4
	General Courses:	
209B	X-Ray Diffraction	3
209C	Electron Microscopy	3
219	Phase Transformations	3
228	Computational Materials	3
279	First-Principles Calculations for Materials	3
281	Technical Communication and Presentation Design	3
	Specialized Courses:	
204	Introduction to Magnetism and Magnetic Materials	3
211B	Engineering Quantum Mechanics II	4
217	Molecular Beam Epitaxy & Band Gap Engineering	3
226	Symmetry and Tensor Properties of Materials	3
227	Metal Organic Chemical Vapor Deposition	3
263	Thin Films and Multilayers	3
288A	Topics in Quantum Materials	3
	Background Courses	
162A	Quantum Description of Electronic Materials	4
162B	Fundamentals of Solid State	4
ECE 162C	Optoelectrical Materials and Devices	4

TABLE III-B. FUNCTIONAL/QUANTUM MATERIALS

Please note course offerings may change from year to year.

Course Number	Course Title	Units
	Major Sequence Courses:	
209A	Crystallography and Diffraction Fundamentals	3
218	Introduction to Inorganic Materials	3
274	Solid State Inorganic Materials	3
	General Courses:	
209B	X-Ray Diffraction	3
209C	Electron Microscopy	3
211A	Engineering Quantum Mechanics	4
219	Phase Transformations	3
222A	Colloids & Interfaces	3
228	Computational Materials	3
241	Structural Inorganic Chemistry	3
281	Technical Communication and Presentation Design	3
	Specialized Courses:	
204	Introduction to Magnetism and Magnetic Materials	3
226	Symmetry and Tensor Properties of Materials	3
242	Symmetries and Group Theory	3
245	Electrochemistry and Electrochemical Methods	3
251	Processing of Inorganic Materials	3
286C	In Situ/ In Operando Methods for Materials Science Research	3
286G	Structural Families of Functional Inorganic Materials	3
286M	Experiments in Inorganic Materials	3
286N	Functional Inorganic Oxides	3
	Background Courses	
Chem 175	Physical Inorganic Chemistry	3

TABLE III-C. MACROMOLECULAR/BIOMOLECULAR MATERIALS

Please note course offerings may change from year to year.

Course Number	Course Title	Units
	Major Sequence Courses:	
271A	Synthesis of Macromolecules	3
271B	Structure and Characterization of Complex Fluids	3
271C	Properties of Macromolecules	3
	General Courses:	
214	Advanced Topics in Equilibrium Statistical Mechanics	3
228	Computational Materials	3
253	Liquid Crystal Materials	4
273	Experimental Techniques in Macromolecular Materials	3
281	Technical Communication and Presentation Design	3
	Specialized Courses:	
272	Mechanical Forces and Biomolecules	3
276A	Biomolecular Materials I: Structure & Function	3
276B	Biomolecular Materials II: Applications	3
278	Interactions in Biomolecular Complexes	3
280A	Synthesis and Electronic Structures of Conjugated Polymers	3
280B	Organic Electronic Devices	3
287A	Structure and Symmetry	3
287B	Electrostatics in Polar Solvents	3
	Background Courses	
135	Biophysics and Biomolecular Materials	3
160	Introduction to Polymer Science	3

TABLE III-D. STRUCTURAL MATERIALS

Please note course offerings may change from year to year.

Course Number	Course Title	Units
	Major Sequence Courses:	
207	Mechanics of Materials	3
220	Mechanical Behavior of Materials	3
234	Fracture Mechanics	3
	General Courses:	
209A	Crystallography and Diffraction Fundamentals	3
209B	X-Ray Diffraction	3
209C	Electron Microscopy	3
219	Phase Transformations	3
228	Computational Materials	3
281	Technical Communication and Presentation Design	3
	Specialized Courses:	
230	Elasticity and Plasticity	3
232	Plasticity	3
240	Finite Element Structural Analysis	3
251	Processing of Inorganic Materials	3
261	Composite Materials	3
263	Thin Films and Multilayers	3
289G	Phase Stability & Microstructure Evolution	3
289H	Statistical Mechanics of Crystalline Solids	3
289J	Crystal Growth and Solidification	3
289LM	Dislocations and Dislocation Dynamics	3
289X	Dynamic Mechanical Behavior	3

Notes:

- Some introductory graduate courses will not be available for credit to students who have taken undergraduate courses covering similar topics, e.g. students cannot get credit toward the MS for ME 166 or ME 162 if they are taking MATRL 207 or vice versa.

APPENDIX B:
SAMPLE SCHEDULES BY UNDERGRADUATE MAJOR

BS-CHEMICAL ENGINEERING/MS-MATERIALS

Junior Year (50 units)					
FALL	**Units**	**WINTER**	**Units**	**SPRING**	**Units**
CH E 120A	4	CH E 120B	3	CH E 119	1
CH E 128	3	CH E 132C	3	CH E 120C	3
CH E 132B	3	CHEM 113B	4	CH E 140A	3
G.E. Elective	4	Tech Elective	3	CH E 180A	3
Matrl 100A†	3	Matrl 100B	3	CHEM 113C	4
				Matrl 100C†	3
Total:	**17**		**16**		**17**
Senior Year (50 units)					
FALL	Units	WINTER	Units	SPRING	Units
CH E 140B	3	CH E 180B	3	CH E 184B	3
CH E 152A	4	CH E 184A	3	Tech Elective	3
G.E. Elective	4	Tech Elective	3	GE Elective	8
Tech Elective	3	GE Elective	4	Matrl Grad. Elec.	3-4
Matrl Grad. Elec.	3-4	Matrl Grad. Elec.	3-4		
Total:	**17-18**		**16-17**		**17-18**
Graduate Year (33 units)					
FALL	**Units**	**WINTER**	**Units**	**SPRING**	**Units**
Matrl Grad. Elec.	9-12	Matrl 596	3*	Matrl 596	3*
		Matrl Grad. Elec.	6-9	Matrl Grad. Elec.	6-9
MATRL 290	1	MATRL 290	1	MATRL 290	1
Total	**10-13**		**10-13**		**10-13**

* Students must take at least 3, but no more than 6 units of Matrl 596.

† Matrl 100A and 100C count toward the undergraduate technical elective requirements.
Note: 6 additional units of undergraduate technical electives must have Materials content.

This sample ChE undergraduate major schedule is following the 18-19 curriculum.

BS-ELECTRICAL ENGINEERING/MS-MATERIALS

Junior Year (58 units)					
FALL	**Units**	**WINTER**	**Units**	**SPRING**	**Units**
ECE 130A	4	ECE 130B	4	ECE 137B	4
ECE 132	4	ECE 137A	4	ECE 139	4
ECE 134	4	ECE Elective	4	ECE 152A	5
GE / Free UG Elec.	4	GE / Free UG Elec.	4	GE / Free UG Elec.	4
Matrl 100A†	3	Matrl 100B†	3	Matrl 100C†	3
Total:	**19**		**19**		**20**
Senior Year (58 units)					
FALL	**Units**	**WINTER**	**Units**	**SPRING**	**Units**
ECE Electives	12	ECE Elec.	8	ENGR 101	3
GE / Free UG Elec.	4	GE / Free UG Elec.	8	ECE Elec.	8
Matrl Grad Elec.	3	Matrl Grad Elec.	3	GE / Free UG Elec.	6
				Matrl Grad Elec.	3
Total	**19**		**19**		**20**
Graduate Year (33 units)					
FALL	**Units**	**WINTER**	**Units**	**SPRING**	**Units**
Matrl Grad. Elec.	9-12	Matrl 596	3*	Matrl 596	3*
		Matrl Grad. Elec.	6-9	Matrl Grad. Elec.	6-9
MATRL 290	1	MATRL 290	1	MATRL 290	1
Total	**10-13**		**10-13**		**10-13**

*Students must take at least 3, but no more than 6 units of Matrl 596.

† Matrl 100A, 100B and 100C count toward the undergraduate departmental elective requirements.
Note: 6 additional units of undergraduate technical electives must have Materials content.

This sample ECE undergraduate major schedule is following the 18-19 curriculum.

BS-MECHANICAL ENGINEERING/MS-MATERIALS

Junior Year (50 units)					
FALL	**Units**	**WINTER**	**Units**	**SPRING**	**Units**
ME 104	3	ME 151B	4	ME 105	4
ME 140A	3	ME 152B	3	ME 153	3
ME 151A	4	ME 163	3	ME 151C	3
ME 152A	4	GE/ Free UG Elec.	4	ME 155A	3
Matrl 100A†	3	Matrl 100B†	3	Matrl 100C†	3
Total:	**17**		**17**		**16**
Senior Year (47 units)					
FALL	**Units**	**WINTER**	**Units**	**SPRING**	**Units**
ME 154, ME 157, or ME 167	3	ME 156B	3	ME 189C	2
ME 156A	3	ME 189B	2	UG Dept. Elec.	6
ME 189A	2	GE / Free UG Elec.	4	GE / Free UG Elec.	4
UG Dept. Elec.	3	UG Dept. Elec.	6	Matrl Grad Elective	3
GE / Free UG Elec.	4	Matrl Grad Elective	3		
Matrl Grad Elec.	3				
Total	**24**		**18**		**15**
Graduate Year (33 units)					
FALL	**Units**	**WINTER**	**Units**	**SPRING**	**Units**
Matrl Grad. Elec.	9-12	Matrl 596	3*	Matrl 596	3*
		Matrl Grad. Elec.	6-9	Matrl Grad. Elec.	6-9
MATRL 290	1	MATRL 290	1	MATRL 290	1
Total	**10-13**		**10-13**		**10-13**

*Students must take at least 3, but no more than 6 units of Matrl 596.

† Matrl 100A, 100B, and 100C count toward the undergraduate departmental elective requirements.

Note: 6 additional units of undergraduate technical electives must have Materials content.

This sample ME undergraduate major schedule is following the 18-19 curriculum.

MATERIALS DEPARTMENT
MS PLAN 2 FOR BS/MS PROGRAM

Name: _____ Perm Number: _____

Entrance Year: _____ UG Department: _____

Materials Research Track: _____

Faculty MS Advisor: _____

Faculty MS Advisor Signature: _____

Dept. Grad Advisor Signature: _____

*Students must complete **42 units** of coursework.*

Major course sequence (9-12 units):
Include units for each course

_____

_____

_____

Elective courses (15-24 units):

_____

_____

_____

_____

_____

_____

_____

_____

Matrl 290: 3

Matrl 596 (3-6 units): _____

Undergrad* (3-6 units): _____

Total Graduate Units: _____

Report Committee (2 faculty members):

_____
Chair (MS advisor)

_____
Member

NOTE: This is a proposed study plan that must be submitted by the end of fall quarter of your fourth year. A final MS study plan must be submitted later for advancement to graduate status.

*THIS IS OPTIONAL: These undergrad units are different from the minimum of 6 undergrad electives with Materials content required toward the BS, to be taken during the senior year.

ACKNOWLEDGMENT OF HAVING READ
BS/MS STUDENT MANUAL

(Print this page, sign it after reading the manual, and turn it in to the Graduate Program Coordinator by the end of the first week of classes in the first quarter after admission to the Program.)

I, _____ acknowledge that I have carefully read and understood the contents of the BS/MS Student Manual for the Materials Department (Edition Fall 2020). I understand my first point of contact for any questions regarding the BS/MS Manual or the BS/MS Materials Program is the Graduate Program Coordinator* in the Materials Department, who may refer me to the Graduate Advisor** in the Materials Department.

_____
Signature

_____
Date

* The current Graduate Program Coordinator is Ms. Jocelyn Guzman

** The current Graduate Advisor is Prof. Anton Van der Ven