

## Course list to satisfy 24 or 30 semester credit requirements

Area	Courses (a course may only be used to satisfy one area)
<u>Thermodynamics and Kinetics</u>	MBSE 212: Thermodynamics and Kinetics of Phase Transformations [4]
<u>Processing and Kinetics</u> (1 course)	MBSE 214: Tissue Engineering Design [4] MBSE 224: Polymeric Materials [4] MBSE 226: Nanodevice Fabrication [4]* <i>*This course is co-convened with an undergraduate class to allow the undergraduate nanotechnology emphasis to continue to be offered. All other required classes are graduate only.</i>
<u>Structure and Bonding</u>	MBSE 210: Structure and Properties of Materials [4]
<u>Properties</u> (1 course)	MBSE 221: Mechanical Behavior of Materials [4] MBSE 224: Polymeric Materials [4] MBSE 241: Materials Cell Interactions [4] MBSE 265: Optoelectronic Properties of Materials [4]
<u>Electives</u> To bring total to: 24 semester credits MS Plan I (20 required to be 200 series) 30 semester credits MS Plan II (24 required to be 200 series) 24 semester credits PhD (20 required to be 200 series)	Any class listed above, not used to satisfy the above requirements, or any of the following. MBSE 219: Materials Simulations [3] MBSE 240: Intramolecular and Surface Forces [4] MBSE 270: Electron Microscopy [3] MBSE 270L: Electron Microscopy Laboratory [1] MBSE 250: Biomimetics [4] MBSE 217: Materials Sustainability [4] MBSE 208: Cell as a Machine [4] MBSE 211: Synthetic Biology [4] MBSE 230: Computation and Modeling for Interdisciplinary Biophysical Sciences, Biomaterials and Biotechnology Sciences [4] MBSE 231: Imaging and Spectroscopy for Interdisciplinary Biophysical Sciences, Biomaterials and Biotechnology Sciences [4] MBSE 232: Bio and Nano Fabrication for Interdisciplinary Biophysical Sciences, Biomaterials and Biotechnology Sciences [4] MBSE 260: Sustainable Energy [4] MBSE 262: Modelling and Design of Energy Systems [3] MBSE 285: Seminar: Nanomaterials for Space Exploration [1] BIOE 242 BioMEMs and Lab on Chip [3] BIOE 256 Principles of Biosensor Design [3] CHEM 202: Bioorganic Chemistry [3] CHEM 250: Chemistry of Surfaces and Interfaces [3] CHEM 281: Introduction to Molecular Dynamics [4] ENGR 292: Intellectual Property for Scientists and Engineers [1] ES 206: Instrumental and Spectroscopic Methods in Environmental Systems [3] ES 208: Surface and Colloidal Chemistry of Earth Materials [3] ES 209: Chemistry and Mineralogy of Earth Materials [3] ES 234: Air Pollution and Resources [3] MATH 223: Asymptotics and Perturbation Methods [4] MATH 231/232: Numerical Solution of Differential Equations I [4] and II [4] ME 221: Rheology [4] ME 229: Tribology [3] ME 236: Advanced Mass Transfer [4] ME 261: Energy Storage [3] ME 262: Fuel Cell Fundamentals, Modeling and Diagnostic [3] PHYS 204: Biophysics [4] PHYS 209: Soft Matter Physics [3] PHYS 241: Condensed Matter Physics [4] QSB 202: Graduate Level Biochemistry [3] QSB 207: Physical Biochemistry [3] QSB 212: Advanced Signal Transduction and Growth Control [4] QSB 250: Embryos, Genes, and Development [3] QSB 252: Cancer Genetics and Tumor Biology [3] QSB 261: Human Physiology [3] QSB 280: Advanced Mathematical Biology [3]

Requirements for MBSE Ph.D. include:

- Complete at least six semesters of full-time academic residence at UC Merced.
- Complete a minimum of 24 semester units in approved courses – *see other page*, at least 20 of which must be earned in 200-series graduate-level courses exclusive of credit given for thesis research and preparation.\*
- Maintain a cumulative GPA of at least 3.0.
- Register for and obtain a satisfactory grade in at least one 3-4 unit 200-level course in each of the 4 MBSE core requirement areas of thermodynamics/kinetics, structure and bonding, processing and kinetics, and properties. Students earning an M.S., either Plan I or Plan II, in MBSE along the way at UC Merced are considered to have completed this degree requirement.
- Register for and obtain a satisfactory grade in MBSE 291: Research Seminar Series – at least once each year of academic residence.
- Register for and obtain a satisfactory grade in MBSE 294: Responsible Conduct of Research.
- Complete at least 16 units of MBSE 295: Graduate Research.
- Serve as a Teaching Assistant for at least one semester.
- Give two open technical seminars: either on campus or at a professional conference.
- Before the end of year 2, present a written dissertation project proposal for approval, and pass an oral qualifying exam on specific competence to pursue the proposed dissertation topic and general preparedness in the discipline, administered by the Qualifying Examination Committee.
- Present a doctoral dissertation containing an original contribution to knowledge in the field for approval, and successfully defend it during a final oral examination, administered by the Doctoral Committee.

\*Transition language has been approved: see next page for descriptions of how to handle courses that are no longer offered and on the use of MBSE 291 and MBSE 294 to meet the 24-unit credit.



## MEMO

To: Marjorie Zatz, Dean of Graduate Education

From: MBSE Graduate Program Chair (Sarah Kurtz)

Date: February 21, 2020

Subject: Requesting approval for transition process for new MBSE Policies and Procedures

MBSE's first official set of Policies and Procedures (P&P) were approved earlier this month. Previously, we were acting on the MBSE proposal that was approved by CCGA. The new P&P have replaced the original requirement of four courses in four Areas (with courses being selected from a list of options for two of the Areas) with a set of three courses that all students must take. This complicates things for the students because some original courses will no longer be offered.

We ask approval of the following guidance, which has been reviewed and approved by the Educational Committee and the Executive Committee

.....

**Students seeking to use the MBSE guidance from the approved proposal**

1. The new course MBSE 211 "Materials Properties" may be used to complete the "Properties" Area requirement without a petition.
2. MBSE 210 and MBSE 212 are changing in name, but may still be used to meet the same two Area requirements that they do now without a petition.
3. Any other course substitutions for the four Area requirements require a petition.
4. All other requirements remain the same.

**Students seeking to use the new P&P**

1. As above, MBSE 210 and/or MBSE 212 taken with the old names/versions may be used in place of taking the new MBSE 210 and/or MBSE 212.
  2. If a student already satisfied the requirement for the Properties Area, they may use that to replace MBSE 211.
  3. All other aspects of the new requirements would be implemented as stated in the new version.
- .....

Additionally, to ease the transition, we request approval of the following:

.....

Students who joined MBSE in 2019 who choose to use the guidance from the MBSE proposal rather than the approved Policies & Procedure have the option of counting up to 2 (3 for non-thesis Masters) units of 200-level credits, such as MBSE 291, MBSE 294, or MBSE 295 toward the total of 24 (30 for non-thesis Masters) units of credit. They are still required to complete 20 (24 for non-thesis Masters) units of 200-level courses that are 3- or 4-unit graded courses, as described in the approved P&P. Thus, they would retain the need to take 4 courses to meet the 4 Area requirements, but would be able to benefit from the new definition of the units requirement.

.....

Note that the approved P&P allows counting up to 4 units of MBSE 291, MBSE 294, etc. for the PhD or thesis Masters, (up to 6 units for the non-thesis Masters).