Materials Science and Technology Major Requirements/Checklist (Fall 2026 Catalog version)

All courses counted towards the MSTC major requirements must be taken for a letter grade (when offered) and passed with a grade of C- or better.

Foundation courses (38-41 credits)

General Chemistry Honors Sequence: CH 224H _____ CH 225H _____ CH 226H _____
Prerequisites for CH 224H: Satisfactory placement score and MATH 112Z
OR General Chemistry Sequence: CH 221Z/2Z/3Z
Prerequisites for CH 221Z: CH 150Z or satisfactory placement score and MATH 111Z

Physics with Calculus Sequence:
PHYS 251 _____ PHYS 252 _____ PHYS 253 _____
Prerequisite for PHYS 251: MATH 112Z; co-requisite for PHYS 251: MATH 251Z
OR Foundations of Physics Sequence: PHYS 201/2/3 (by petition)
Prerequisite for PHYS 201/251: MATH 112Z or equivalent

General physics/chemistry laboratory (2-4 credits):
PHYS 204/5 OR PHYS 290 (2 terms) OR CH 227Z/8Z
Course 1 _____ Course 2 _____

Research Immersion lab: CH 329 _____

Fundamentals of Materials in Technology Sequence: MSTC 231 _____ MSTC 232 _____
Pre/co-requisite for MSTC 231: CH 221Z or CH 224H

Application into undergraduate Materials Science and Technology program (after completing Foundation courses)

- Application components: transcripts, preference for research area (for match with faculty mentor)
- Guaranteed admission: GPA of 3.0 or better in Foundation courses
- If grade cutoff is not met – application review based on academic performance + additional application components: CV, short answer essays, instructor recommendation letter(s)

Mathematics and computation (28 credits)

Calculus Sequence: MATH 251Z _____ MATH 252Z _____ MATH 253Z _____
Prerequisite for MATH 251Z: MATH 112Z or satisfactory placement score

Differential Equations: MATH 256 _____
Prerequisite: MATH 252Z

Several-variable Calculus: MATH 281 _____
Prerequisite: MATH 252Z

Advanced Mathematics/Computation electives: Two courses from the following list

Course 1 _____ Course 2 _____

- PHYS 389 Mathematical Methods
- PHYS 445 Computational Physics
- CH 447 Computational Chemistry
- MATH 341 Elementary Linear Algebra
- MATH 282 Several-variable Calculus II
- CS 210/1/2 Computer Science I, II, III

Other courses that meet advanced math/computation requirements may be requested by petition

Fundamentals of Materials Science (32 credits)

Quantum mechanics, Thermodynamics and Statistical Mechanics sequence (choose one):

PHYS 351 _____ PHYS 352 _____ PHYS 353 _____

OR

CH 411 _____ CH 412 _____ CH 413 _____

Advanced Lab: Three courses from the following list

Course 1 _____ Course 2 _____ Course 3 _____

- CH 337, CH 338 or 348, CH 339 or 349 Organic Chemistry Laboratory
- CH 417/8/9 Physical Chemistry Laboratory
- CH 429 Instrumental Analysis
- PHYS 391 Physics Experimentation Data Analysis Laboratory
- PHYS 431 Analog Electronics
- PHYS 432 Digital Electronics
- PHYS 481 Design of Experiments
- PHYS 495 Nanofabrication
- DSCI 101 Foundations of Data Science I

Up to four of the twelve required Advanced Lab credits may be met by undergraduate research credits (PHYS 401, PHYS 491/2/3, CH 401) instead of the courses listed.

Thermodynamics, Kinetics and Transport in Advanced Materials: MSTC 431 _____ MSTC 432 _____

Prerequisites for MSTC 431: MSTC 232, PHYS 352 or CH 411, MATH 256, MATH 281

Materials Science and Technology focus area (8 credits)

Choose one focus area, within which eight credits are to be completed

Solid-state materials and devices: MSTC/PHYS 441M _____ MSTC/PHYS 442M ____

Prerequisites for MSTC/PHYS 441M: PHYS 351 or CH 413 or CH 431, MATH 256, MATH 281 (MSTC 441M/442M subject course preferred)

OR

Soft/biological materials: Choose two courses out of the following list

Course 1_____ Course 2 _____

- PHYS 444 Introduction to Biological Physics
  Prerequisites: PHYS 352, MATH 281
- CH 410 Polymer Materials
  Prerequisites: Organic Chemistry
- BIOE 431 Biomaterials
  Prerequisites: General Chemistry

Upper-division elective courses (12 credits)

Three upper division or graduate level materials science, chemistry or physics courses on top of the courses outlined above. Courses are expected to be 400 level or above and must be chosen in consultation with the program director/advisor. Sample courses are listed by subject area below, but other courses may be added by petition.

Course 1 _____
Course 2 _____
Course 3 _____

Applied materials physics
- PHYS 412
- PHYS 413
- PHYS 422
- PHYS 414
- PHYS 415
- PHYS 417
- PHYS 424
- PHYS 425

Organic-inorganic materials chemistry
- CH 420
- CH 421
- CH 431
- CH 432
- CH 433
- CH 447

Physical materials chemistry
- CH 429
- CH 441
- CH 442
- CH 443
- CH 445
- CH 446
- CH 447

Graduate courses from the Electrochemistry, Quantum Technologies, or KCGIP Masters programs