Where do I find the BSME curriculum?
The curriculum worksheet and registration FAQs can be found on the department web site.
https://mems.wustl.edu/undergraduate/programs/Pages/BS-in-Mechanical-Engineering.aspx

What are the BSME degree requirements?
The best way for a student to track degree requirements is to look at a degree audit on WUachieve. This will include new courses that satisfy requirements from a previous catalog date. An advisor or student can request a degree audit at any time online at the link below. Degree requirements follow the catalog date when the student matriculated.
https://engineering.wustl.edu/current-students/student-services/Pages/WUachieve.aspx

Are prerequisites strictly enforced?
Yes. However, requests for waiver of prerequisites or substitution of required courses must be submitted in writing to the Director of Undergraduate Studies and must be approved by the course instructor, the student’s advisor, and the Associate Department Chair. Prerequisites are listed in the course description in WebSTAC and on the BSME curriculum worksheet.

Is MEMS 101 Intro to Mechanical Engineering and Mechanical Design required?
For students matriculating into WashU mechanical engineering programs in fall 2020 or later, MEMS 101 is required. Students who matriculated before 2020 are not required to take MEMS 101.

What is the chemistry requirement for the BSME?
Students have the option of taking Chem 105 or Chem 111A. The two courses cover similar material except Chem 105 includes a review of chemistry fundamentals while Chem 111A covers quantum mechanics. Students must also take Chem 151 General Chemistry Lab.

Does Chem 105 satisfy chemistry requirements in other engineering degree programs?
Chem 105 will satisfy chemistry 1 requirements for all other engineering degrees except the BSBME.

Do I have enough engineering topics courses?
Students who transfer in credit for engineering courses could be short of engineering topics. Topics units are totaled in the degree audit on WUAchieve. A database of courses from other schools approved for transfer credit is available at the following link.
http://registrar.seas.wustl.edu/EVALS/evals.asp

When should I declare a major?
Students who have not declared a major should do so by the third semester.
How often are MEMS courses offered?
BSME courses are offered on a regular schedule as indicated on the curriculum worksheet. Planned future and past offerings can be found on the MEMS web site. [https://mems.wustl.edu/undergraduate/programs/Pages/BS-in-Mechanical-Engineering.aspx](https://mems.wustl.edu/undergraduate/programs/Pages/BS-in-Mechanical-Engineering.aspx) MEMS 255 and 350 are offered both fall and spring semesters. Recent offering history can be used to project forward for anticipated future offerings. Offering history can be found in WebSTAC for a particular course under “details” and “frequency”.

Which of the required MEMS courses are offered only once a year?
205 (SP), 301 (FL), 305 (SP), 3110 (SP), 3410 (FL), 3420 (SP), 3610 (SP), 405 (FL), 411 (FL), 412 (SP), 4301 (SP) and 4310 (FL).

What if I need to take MEMS 253 Statics & Mechanics of Materials or MEMS 3610 Materials Science in semesters they are not offered?
Students make take BME 240 (offered in the spring) to satisfy MEMS 253, which is only offered in the fall. Students may take EECE 305 Materials Science (offered in the fall) to satisfy MEMS 3610, which is only offered in the spring.

What is the physical or life science elective?
A course from Bio, EPSc, EnSt, Phys, Chem taken for credit and graded: A suitable course is a 3 unit 2xx or greater course from Bio (L41), EPSc (L19), EnSt (L82), Phys (L31) or Chem (L07) with a NSM attribute (natural sciences and mathematics). University College U29 204 is not approved as a PLS elective. Some suggested courses are:

- E62 BME 314 Physics of the Heart
- L31 Phys 350 Physics of the Heart
- L19 EPSc 201 Earth and the Environment
- L19 EPSc 219 Energy and the Environment
- L19 EPSc 323 Biogeochemistry
- L82 EnSt 201 Earth and the Environment
- L82 EnSt 272A Physics and Society
- L07 Chem 112A Chemistry II
- L07 Chem 261 Organic Chemistry
- L41 Bio 2960 Biology
- L41 Bio 2970 Biology
- L41 Bio 303A Human Biology
- L31 Phys 217 Introduction to Quantum Mechanics

Can AP credit be used to satisfy degree requirements?
Students in the McKelvey School of Engineering are given advanced placement in courses based upon the exam scores listed at the link below. The maximum number of general elective credit units from AP scores that can count toward a bachelor's degree is 15. No humanities or social sciences credit is awarded for AP scores. [http://engineering.wustl.edu/current-students/student-services/Pages/advanced-placement.aspx](http://engineering.wustl.edu/current-students/student-services/Pages/advanced-placement.aspx)

Which courses count as social science or humanities?
Washington University in St. Louis courses labeled with the EN:H or EN:S attribute in the semester course listings will count respectively toward the humanities or social
How do I find social science and humanities courses in WebSTAC?
WebSTAC has a search feature that will reveal courses with an H or S attribute. Go to:
WebSTAC; Course Listings; by Semester Search; FL2020 Arts and Sciences; choose
details (department, level, time, etc) and EN H or EN S.

Do the ethics and professional values courses count as social science or humanities?
Three one-unit courses, E60 4501, 4502 and 4503 are the ethics and professional values
courses that count as SS credit. E60 Engr 450F, Urban Sustainability Challenges through
the Lens of Engineering Ethics, Leadership and Conflict-Mngt (3 units) may be taken to
satisfy the 4501, 4502 and 4503 requirements.

Which courses satisfy the control systems requirement?
ME’s can take either MEMS 4301 Modeling Simulation and Control (spring) or ESE 441
Control Systems (fall and spring) to satisfy the control systems requirement. Note that
the ESE 441 prerequisite is ESE 351 or MEMS 4310.

I have a conflict with MEMS 4301.
Instead of taking MEMS 4301, take ESE 441 Control Systems (fall and spring). Note that
the ESE 441 prerequisite is ESE 351 or MEMS 4310.

Is MEMS 201 Numerical Methods and Matrix Algebra required?
Students can choose to take MEMS 201 or ESE 318 EnMath A. ME students are
encouraged to take MEMS 201 because it teaches MATLAB and Excel, both of which
are common and important software tools used in academia and industry. The software is
applied to solve mechanical engineering problems.

MATLAB resources are listed below:
https://matlabacademy.mathworks.com/
www.learningmatlab.com/videos/

Application specific MATLAB resources for particular courses
http://www.colorado.edu/mechanical/programs/undergraduate/matlab_tutorials/ (fluids and heat transfer)

Books and notes
http://www.academia.edu/5838447/Lecture_on_MATLAB_for_Mechanical_Engineers

What are Engineering Math A and Engineering Math B?
ESE 319 Engineering Math B is required. Students can choose between MEMS 201
Numerical Methods and Matrix Algebra and ESE 318 Engineering Math A.
Is Math L24 3200 equivalent to ESE 326?
Math L24 3200 (or L24 320) does NOT satisfy the ESE 326 requirement.

What are the prerequisites for MEMS E37 411 Mechanical Engineering Design?
E37 MEMS 3110 Machine Elements and E37 3420 Heat Transfer are the prerequisites for E37 MEMS 411 Mechanical Engineering Design Project.

In which extracurricular activities do MEs participate?
The faculty and administration encourage participation in extracurricular activities. Ask your advisor on how to get involved with AIAA, ASME, Design Build Fly (DBF), Engineers Without Boarders (EWB), FSAE, or IEEE (the dance floor for Vertigo has been a popular project that involves students from many departments). Take the first step to learn about the profession and apply your studies to “real-world” problems through extra curricular activities.

How many units can I take?
Full undergraduate tuition covers 12-21 units. Undergraduates must maintain full time status by taking a minimum of 12 units each semester for the entire semester.

What are the BSME requirements for my matriculation year?
See the department web site for the curriculum checklist by catalog year.
https://mems.wustl.edu/undergraduate/programs/Pages/BS-in-Mechanical-Engineering.aspx

How do I become a professional engineer?
Professional licensure in engineering is an option for seniors to consider; the initial step is to pass the Fundamentals of Engineering exam. Apply to the Missouri Board of the NCEES to register for the exam. To be eligible, one must have earned or expect to earn an ABET accredited degree in engineering. More information on NCEES, licensure, the exam and registration can be found at
https://ncees.org/engineering/fe/
https://ncees.org/about/
**When can I use the pass/fail option?**

There are restrictions on when a student may use the pass/fail grading option.

- MEMS degree requirements that list specific courses are **not** satisfied with courses taken pass/fail.
- MEMS elective degree requirements are **not** satisfied with courses taken pass/fail.
- The Physical or Life Science Elective degree requirement is **not** satisfied with courses taken pass/fail.
- The pass/fail grading option may be used with the humanities/social sciences electives course requirement or with free electives.
- Engineering students are eligible to register each semester for up to 6 units on the pass/fail option, up to a maximum of 18 units attempted. The pass/fail grading option replaces the letter grades A-F with either P# or F#. Assigning the grade P# to a course means the student passed the course; assigning the grade F# means the student did not pass the course. Neither grade affects the student's grade-point average. The units attached to a course assigned the grade P# may count towards the student's total cumulative units required.

**How is a repeat course noted on my transcript?**

If a student repeats a course, only the second grade is included in the calculation of the grade point average. Both enrollments and grades are shown on the student’s official transcript. The symbol R next to the first enrollment’s grade indicates that the course was later retaken. Credit toward the degree is allowed for the latest enrollment only.

**How can students get involved with undergraduate research?**

Students interested in pursuing an undergraduate research project should contact the faculty member he or she is interested in working with. If the faculty member agrees to supervise the student, the student must either be paid for the work or register for MEMS 400 Independent Study (see the Independent Study section at the end of this document).

**Where can I find information on popular minors?**

Information on the following popular technical minors may be found at:

https://mems.wustl.edu/undergraduate/programs/Pages/minors.aspx

- Aerospace Minor
- Energy Engineering Minor
- Environmental Engineering Science Minor
- Materials Science and Engineering Minor
- Mechatronics Minor
- Nanoscale Science and Engineering Minor
- Robotics Minor

**What is the best strategy to select courses for the 9 units of MEMS senior electives?**

The purpose of these elective courses is to provide an in depth learning experience in one of the core topics of the BSME curriculum. Core curriculum topics are grouped (i) Aerospace, (ii) Biomechanics, (iii) Computational Mechanics, (iv) Energy Systems, (v) Materials Science, and (vi) Thermal Systems. A student may choose one of the areas and take three courses in that area to fulfill the elective requirement or select three courses
from the comprehensive list in the following FAQ. MEMS senior elective courses may also partially satisfy the requirements for a minor. See specific minors for requirements.

Aerospace
MEMS 5414   Aeroelasticity
MEMS 5700   Aerodynamics
MEMS 5701   Aerospace Propulsion
MEMS 5703   Analysis of Rotary Wing Systems
MEMS 5704   Aircraft Structures
MEMS 5705   Wind Energy Systems
MEMS 5706   Aircraft Performance
MEMS 5707   Flight Dynamics

Mechanics and Biomechanics
BME 459    Intermediate Biomechanics
MEMS 5500   Elasticity
MEMS 5501   Mechanics of Continua
MEMS 5506   Experimental Methods in Solid Mechanics
MEMS 5515   NSIM I
MEMS 5562   Cardiovascular Mechanics
MEMS 5564   Orthopedic Biomechanics-Cartilage/Tendon
MEMS 5565   Mechanobiology
MEMS 5566   Engineering Mechanobiology
BME 465    Bio-Solid Mechanics
BME 468    Cardiovascular Dynamics
BME 504    Light Microscopy and Optical Imaging
BME 527    Design of Artificial Organs

Computational Mechanics
MEMS 424    Introduction to Finite Element Analysis of Structures
MEMS 5412   Computational Fluid Dynamics
MEMS 5413   Advanced Computational Fluid Dynamics
MEMS 5001   Optimization Methods in Engineering
MEMS 5104   CAE-Driven Mechanical Design

Energy Systems
MEMS 5420   HVAC I Analysis and Design
MEMS 5421   HVAC II Analysis and Design
MEMS 5422   Solar Energy Thermal Processes
MEMS 5423   Sustainable Environmental Building Systems
MEMS 5424   Thermo-Fluid Modeling of Renewable Energy Systems
MEMS 5705   Wind Energy Systems
ESE 437    Sustainable Energy Systems

Materials Science
MEMS 5507   Fatigue and Fracture Analysis
MEMS 5601   Mechanical Behavior of Materials
MEMS 5602   Non-metallics
MEMS 5603   Materials Characterization I
MEMS 5604   Materials Characterization II
MEMS 5605   Mechanical Behavior of Composites
MEMS 5606   Soft Nanomaterials
MEMS 5607   Introduction to Polymer Blends and Composites
MEMS 5608   Introduction to Polymer Science and Engineering
MEMS 5610   Quantitative Materials Science & Engineering
MEMS 5612   Atomistic Modeling of Materials
MEMS 5613   Biomaterials Processing
MEMS 5614   Polymeric Materials Synthesis and Modification
MEMS 5615   Metallurgy and Design of Alloys
**Thermal Fluids Systems**

MEMS 5401  General Thermodynamics  
MEMS 5402  Radiation Heat Transfer  
MEMS 5403  Conduction and Convection Heat Transfer  
MEMS 5410  Fluid Dynamics I  
MEMS 5411  Fluid Dynamics II  
MEMS 5412  Computational Fluid Dynamics  
MEMS 5413  Advanced Computational Fluid Dynamics  
MEMS 5422  Solar Energy Thermal Processes  
MEMS 5424  Thermo-Fluid Modeling of Renewable Energy Systems  
MEMS 5425  Thermal Management of Electronics  
EECE 512  Combustion Phenomena

**What are the requirements for the 9 units of MEMS senior electives?**

*Independent Study*

Only 3 units of Independent Study (MEMS 400) are allowed as a MEMS senior elective. Students can register for this course to pursue a project or research with a supervising faculty member. An independent study proposal and petition must be submitted and approved **before the first day of classes** of the semester. The petition form can be found here: [https://mems.wustl.edu/undergraduate/Pages/independent-study.aspx](https://mems.wustl.edu/undergraduate/Pages/independent-study.aspx). Each section of the proposal must be filled out in detail including: a clear definition the project, an assessment of the student's background and skills to perform the required procedures and methods, and a firm set of expected deliverables and schedule. At the end of the semester a copy of the deliverables is to be submitted to the department to be filed with the student’s records. For a 3 credit course, a student is typically expected to spend 8-10 hours a week, meet weekly with his or her project supervisor, and submit a substantial report at the end of the project. *WebSTAC will reveal independent study and internship sections if the “hide” box is unchecked (the default is to hide these sections).*

*Courses from outside the department*

One of the MEMS (3xx/4xx/5xx) senior electives (3 units) may be taken from another department with permission. Transfer credit may be used as one of the MEMS (3xx/4xx/5xx) electives (3 units) with permission. Please see the list below for approved courses or send a request to the Director of Undergraduate Studies for approval of other courses. Note that graduate courses, MEMS (5xx), often do not list prerequisites, so the student should check with the instructor to determine the level of material to be covered.

Approved BSME senior elective courses:

- E37 MEMS 3601 Materials Engineering
- E37 MEMS 400 Independent Study (3 units are allowed with department approval)
- E37 MEMS 4101 Manufacturing Processes
- E37 MEMS 424 Introduction to Finite Element Analysis of Structures
- E37 MEMS 463 Nanotechnology Concepts and Applications
- E37 MEMS 5001 Optimization Methods in Engineering
- E37 MEMS 5102 Materials Selection in Design
- E37 MEMS 5104 CAE-Driven Mechanical Design
- E37 MEMS 5301 Nonlinear Vibrations
- E37 MEMS 5302 Theory of Vibrations
- E37 MEMS 5401 General Thermodynamics
E37 MEMS  5402 Radiation Heat Transfer
E37 MEMS  5403 Conduction and Convection Heat Transfer
E37 MEMS  5404 Combustion Phenomena
E37 MEMS  5410 Fluid Dynamics I
E37 MEMS  5411 Fluid Dynamics II
E37 MEMS  5412 Computational Fluid Dynamics
E37 MEMS  5413 Advanced Computational Fluid Dynamics
E37 MEMS  5414 Aeroelasticity
E37 MEMS  5420 HVAC I Analysis and Design
E37 MEMS  5421 HVAC II Analysis and Design
E37 MEMS  5422 Solar Energy Thermal Processes
E37 MEMS  5423 Sustainable Environmental Building Systems
E37 MEMS  5424 Thermo-Fluid Modeling of Renewable Energy Systems
E37 MEMS  5425 Thermal Management of Electronics
E37 MEMS  5500 Elasticity
E37 MEMS  5501 Mechanics of Continua
E37 MEMS  5506 Experimental Methods in Solid Mechanics
E37 MEMS  5507 Fatigue and Fracture Analysis
E37 MEMS  5515 Numerical Simulation in Solid Mechanics I
E37 MEMS  5560 Interfaces and Attachments in Natural and Engineered Structures
E37 MEMS  5562 Cardiovascular Mechanics
E37 MEMS  5564 Orthopaedic Biomechanics-Cartilage/Tendon
E37 MEMS  5565 Mechanobiology of Cells and Matrices
E37 MEMS  5566 Engineering Mechanobiology
E37 MEMS  5601 Mechanical Behavior of Materials
E37 MEMS  5602 Non-metallics
E37 MEMS  5603 Materials Characterization I
E37 MEMS  5604 Materials Characterization II
E37 MEMS  5605 Mechanical Behavior of Composites
E37 MEMS  5606 Soft Nanomaterials
E37 MEMS  5607 Introduction to Polymer Blends and Composites
E37 MEMS  5608 Introduction to Polymer Science and Engineering
E37 MEMS  5610 Quantitative Materials Science & Engineering
E37 MEMS  5611 Principles and Methods of Micro and Nano Fabrication
E37 MEMS  5612 Atomistic Modeling of Materials
E37 MEMS  5613 Biomaterials Processing
E37 MEMS  5614 Polymeric Materials Synthesis and Modification
E37 MEMS  5615 Metallurgy and Design of Alloys
E37 MEMS  5700 Aerodynamics
E37 MEMS  5701 Aerospace Propulsion
E37 MEMS  5703 Analysis of Rotary Wing Systems
E37 MEMS  5704 Aircraft Structures
E37 MEMS  5705 Wind Energy Systems
E37 MEMS  5706 Aircraft Performance
E37 MEMS  5707 Flight Dynamics
E37 MEMS  5801 Micro-Electro-Mechanical Systems I
E35 ESE  337 Electronic Devices and Circuits
E35 ESE  405 Reliability and Quality Control
E35 ESE  415 Optimization
E35 ESE  437 Sustainable Energy Systems
E35 ESE  442 Digital Control Systems
E35 ESE  444 Sensors and Actuators
E35 ESE  446 Robotics Dynamics and Control
E35 ESE  447 Robotics Laboratory
E62 BME  459 Intermediate Biomechanics
E62 BME  463 Orthopaedic Biomechanics-Bones and Joints
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