

UMN Doc Template - Gold



Biomechanics

Sub-plan Advisor: [Professor Kyoko Yoshida](#)

Below is the list of Engineering & Science Electives (ESE) approved for this sub-plan. If you follow the requirements outlined and choose courses only from this list, your ESE plan is guaranteed to fulfill subplan degree requirements. To request approval for a course not included in this list, speak with the sub-plan advisor.

For the most accurate information about when courses are offered and prerequisite requirements, visit [ScheduleBuilder](#) or the [University of Minnesota catalog](#). This list is only reviewed for accuracy once/year and listed prerequisites or semesters offered may not reflect changes made by other departments.

Important notes when choosing classes:

- All BME Students are required to have at least 27 credits of Engineering & Science Electives to complete the program.
- A maximum of 6 “experiential” credits (Directed Research/Directed Study, PIES, Co-op) may be counted towards the total credit requirement. 3 of these credits can be included in Group C with the remaining 3 falling into Group D.
- A maximum of 4 credits at the 1xxx/2xxx level may be counted towards total credits requirement. (This means students who take both CHEM2302 + CHEM2311 **may not** count both classes towards their ESE requirement.)
- With the exception of experiential coursework (outlined above), courses listed in more than one group may be counted only once towards the total credits requirement (i.e. BMEN 5201 may count as Group A or Group B, but not both).
- If a course requires a prerequisite and ***you do not already take that course (or an equivalent BME course)*** as a part of the required BME curriculum, the prerequisite course has been listed underneath the course title *in italics*. The prerequisite class is included on the list of courses approved for this subplan (though it may be found in a different Group). Corequisite courses are listed with the ‘&’ symbol.



Group A - Advanced BME Courses

Students must choose at least 6 credits from this list.

Course Number	Course Title	Credits	Semester typically offered
BMEN 5001	Advanced Biomaterials	3	Fall
BMEN 5101	Advanced Bioelectricity and Instrumentation	3	Spring
BMEN 5201	Advanced Biomechanics	3	Spring
BMEN 5311	Advanced Biomedical Transport Processes	3	Spring
BMEN 5351	Cell Engineering	3	Fall
BMEN 5801	Biomedical Data Science	3	Fall

Group B - Core Sub-plan Courses

Students must choose at least 6 credits from this list.

Course Number	Course Title	Credits	Semester typically offered
BMEN 5201	Advanced Biomechanics	3	Spring
BMEN 5251	Finite Element Methods for BME	3	Spring
ME 3221	Fundamentals of Design and Manufacturing (prerequisite = AEM 3031)	4	Fall/Spring/Su
ME 5228	Introduction to FEM, Analysis, & Design (prerequisite = ME 3221)	4	Fall
AEM 4501	Aerospace Structures (prerequisite = AEM 3031)	3	Spring
AEM 4511	Mechanics of Composite Materials (prerequisite = AEM 3031)	3	Spring

Group C - Additional Sub-plan Courses

When added together, coursework from Groups A+B+C must equal at least 20 credits.

Course Number	Course Title	Credits	Semester typically offered
BMEN 4013	CAD of Biomechanical/Transport Devices	1	Fall
BMEN 4015	CAE of Biomechanical/Transport Devices	1	Fall
BMEN 5041	Tissue Engineering	3	Spring
BMEN 5311	Advanced Biomedical Transport Processes	3	Spring
AEM 3031	Deformable Body Mechanics	3	Fall/Spring/Su
AEM 5501	Continuum Mechanics (prerequisite = AEM 3031)	3	Fall
AEM 5503	Theory of Elasticity (prerequisite = AEM 4501)	3	Spring
ME 3222	Mechanisms and Machine Design (prerequisite = ME 3221 or &ME 3221)	4	Fall/Spring/Su
RSC 5135	Advanced Biomechanics I: Kinematics	3	Fall, odd years
RSC 5235	Advanced Biomechanics II: Kinetics	3	Spring, even years
BMEN 4793	Directed Study	1-3	Fall/Spring/Su
BMEN 4794	Directed Research	1-3	Fall/Spring/Su
BMEN 4151	Physician Inspired Engineering Solutions (PIES)	1-3	Fall/Spring
CSE 4896	Industrial Assignment (Co-op, first semester)	2	Spring/Summer
CSE 4996	Industrial Assignment (Co-op, second semester)	2	Fall/Summer

Group D - Recommended Elective Courses

Course Number	Course Title	Credits	Semester <i>typically offered</i>
BMEN 5151	Intro to BioMEMS & Medical Microdevices	2	Spring
BIOC 5444 / PHSL 5444	Muscle	3	Spring
CPMS 5101	Clinical Physiology and Movement Science	3	Fall
MATH 4242	Applied Linear Algebra	4	Fall/Spring/Su
MATH 5587	Elementary Partial Differential Equations	4	Fall
MATS 3001	Thermodynamics of Materials	3	Fall
IE 5511	Human Factors and Work Analysis	4	Fall
RSC 5231	Clinical Biomechanics	2-5	Fall
BMEN 4793	Directed Study	1-3	Fall/Spring/Su
BMEN 4794	Directed Research	1-3	Fall/Spring/Su
BMEN 4151	Physician Inspired Engineering Solutions (PIES)	1-3	Fall/Spring
CSE 4896	Industrial Assignment (Co-op, first semester)	2	Spring/Summer
CSE 4996	Industrial Assignment (Co-op, second semester)	2	Fall/Summer