Faculty Executive Committee Approved Regulations and Policies Outlining the Technical Breadth Requirement

Technical Breadth Areas (Effective Fall 2017 as of 7/20/17)

- Students must satisfy a single Technical Breadth Area (TBA) outside their major's department. Example: students in the bioengineering major can not choose the TBA in Bioengineering.
- Students do have the option to choose a course offered by their major’s department IF the course is part of a schoolwide TBA (e.g. Engineering Mathematics) and not being used to satisfy other degree requirements. Example: the TBA in Engineering Mathematics lists COM SCI 112 which is not required for the Computer Science and Engineering major, therefore a student in Computer Science and Engineering can choose COM SCI 112 to satisfy that TBA. This course cannot also be used simultaneously to fulfill a Major Field Elective.
- As part of the TBA, a student may choose to take one multiple-listed course that is multiple-listed between the student's department and other departments as long as that multiple-listed course is approved for the TBA and the student is not using the multiple-listed course to satisfy other requirements in the student's major. Students can petition a second multiple-listed course for consideration toward the TBA.
- Aerospace Engineering and Mechanical Engineering majors should refer to the HSSEAS Announcement for clarification on their options.

Courses chosen to satisfy the TBA cannot be used to satisfy other degree requirements.*

- Students are responsible for meeting requisites of courses selected.
- Students may petition, at 6426BH, to use one lower division course to satisfy a technical breadth elective IF that lower division course is a prerequisite for at least one of the two upper division technical breadth courses that the student takes from the same area (and that lower division course is not being applied toward another degree requirement).
- Effective W16, Theater C146A will NO longer be considered in satisfaction of any TBA; however, students may petition this course at 6426BH toward the General Education Foundation - Visual and Performance Arts Analysis and Practice.

*Degree requirements include required courses, major field electives, science & technology electives, etc - any course that satisfies a degree requirement.

The Technical breadth requirement is a 12 unit requirement. To complete the requirement with only three courses, those three courses must add up to at least 12 units. SEE PAGE 2 OF THIS DOCUMENT FOR A SUMMARY OF THE RESTRICTIONS.

The Technical Breadth area in Bioengineering is designed to provide students with the opportunity to gain working knowledge of a technical field other than his/her major. Required Upper Division Courses (12 units): select from BIOENGR 100 through 187. One of the three courses can be substituted by CHEM 20B or by LIFESCI 3 if not used to satisfy other degree requirements and additional two courses that are applied to technical breadth area are upper division.

SEE PAGE 2 OF THIS DOCUMENT FOR A SUMMARY OF ALL THE RESTRICTIONS.

The Technical Breadth area in Chemical and Biomolecular Engineering is designed to provide students with the opportunity to gain working knowledge of a technical field other than his/her major. Required Upper Division Courses (12 units): select from CH ENGR 100 through 187. One of the three courses can be substituted by CHEM 20B if not used to satisfy other degree requirements and additional two courses that are applied to technical breadth area are upper division. Restriction: CH ENGR 102A (not open to students with MECH&AE 105A credit).

SEE PAGE 2 OF THIS DOCUMENT FOR A SUMMARY OF ALL THE RESTRICTIONS.

The Technical Breadth area in Civil and Environmental Engineering is designed to provide students with the opportunity to gain working knowledge of a technical field other than his/her major. Required Upper Division Courses (12 units): select from C&EE 100 through 187. One of the three courses can be substituted by CHEM 20B if not used to satisfy other degree requirements and additional two courses that are applied to technical breadth area are upper division. Restrictions: C&EE 101 (not open to students with MECH&AE 101 (formerly 96) credit), C&EE 108 (not open to students with MECH&AE 101 (formerly 96) credit), C&EE 103 (not open to students with EL ENGR 133A credit).

SEE PAGE 2 OF THIS DOCUMENT FOR A SUMMARY OF ALL THE RESTRICTIONS.

The Technical Breadth area in Computer Science is designed to provide students with the opportunity to gain working knowledge of a technical field other than his/her major. Required (12 units): select from COM SCI 102 through 187. COM SCI 31, 32, 33 can all be applied toward satisfaction of this TBA if not used to satisfy other degree requirements.

The Technical Breadth area in Electrical Engineering is designed to provide students with the opportunity to gain working knowledge of a technical field other than his/her major. Required Upper Division Courses (12 units): select from EL ENGR 10, 100 through 187 EXCEPT EL ENGR CM182. Restrictions: EL ENGR 102 (not open to students with MECH&AE 107 credit), EL ENGR 133A (not open to students with C&EE 103 credit). See restrictions among EL ENGR 10, 100, 110 ON PAGE 2 OF THIS DOCUMENT FOR A SUMMARY OF RESTRICTIONS.

The Technical Breadth area in Materials Science and Engineering is designed to provide students with the opportunity to gain working knowledge of a technical field other than his/her major. Required Upper Division Courses (12 units): select from MAT SCI 100 through 187. One of the three courses can be substituted by CHEM 20B if not used to satisfy other degree requirements and additional two courses that are applied to technical breadth area are upper division.

The Technical Breadth area in Mechanical and Aerospace Engineering is designed to provide students with the opportunity to gain working knowledge of a technical field other than his/her major. Required Upper Division Courses (12 units): select from MECH&AE 100 through 187. Restrictions: MECH&AE 101 (formerly 96) (not open to students with C&EE 101 or C&EE 108 credit), MECH&AE 102 (not open to students with C&EE 101 credit), MECH&AE 105A (not open to students with CH ENGR 102A credit), MECH&AE 105D (not open to students with CH ENGR 101B credit). SEE PAGE 2 OF THIS DOCUMENT FOR A SUMMARY OF ALL THE RESTRICTIONS.

The Technical Breadth area in Computational Genomics is designed to provide students with a broad background in Genomics. Required courses (12 unit minimum). Select from: LIFESCI 4 (required unless it is taken to satisfy another degree requirement), additional courses from EE BIOL 135, HUM GEN C144, MCD BIO 144, MCD BIO 172, PHYSCI 125 and for enrollment in any of the following 200 level courses undergraduates need to petition, at 6426BH, and approval is subject to student meeting course requisites and having at minimum a 3.0 GPA: BIOMATH M203, BIOMATH M211, BIOSTAT M272, BIOSTAT M278, EE BIOL M231, HUM GEN 236A HUM GEN 236B, STATS M254.

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The Technical Breadth area in Energy and the Environment is designed to provide students with a broad-background in science and technology related to renewable energy. Required Courses (12 units): select from CH ENGR 102A (not open to students with MECH&AE 105A credit), CH ENGR CM127, C&EE 151, C&EE 153, EL ENGR M185, ENVIRON 157, ENVIRON 159, MECH&AE 105A (not open to students with CH ENGR 102A credit), MECH&AE 133A, MECH&AE 135, MECH&AE 136 and for enrollment in any of the following 200 level courses undergraduates need to petition, at 6426BH, and approval is subject to student meeting course requisites and having at minimum a 3.0 GPA. CH ENGR 223, EL ENGR 279AS (specifically Introduction to Clean Energy Science and Technology), MAT SCI 252, MAT SCI 298 (specifically Materials Science for Alternative Energy Technologies) SEE BOTTOM OF THIS PAGE FOR A SUMMARY OF ALL THE RESTRICTIONS

The Technical Breadth area in Engineering Mathematics is designed to provide students with the opportunity to gain working knowledge of a technical field other than his/her major. Required Courses (12 units): select from C&E 110, COM SCI 112, COM SCI 170A, COM SCI 180, COM SCI 181, EL ENGR 102 (not open to students with MECH&AE 107 credit), EL ENGR 133A (not open for students with C&E 103 credit), EL ENGR 131A, MECH&AE 181A, MECH&AE 182B, MECH&AE 182C, MATH 110A, MATH 115A, MATH 131A, MATH 132, MATH 164, MATH 167, STATS 105. MECH&AE 181A, MECH&AE 182B and MECH&AE 182C are acceptable for mechanical and aerospace engineering majors. SEE BOTTOM OF THIS PAGE FOR A SUMMARY OF ALL THE RESTRICTIONS

The Technical Breadth area in Engineering Science is designed to provide students with the opportunity to gain working knowledge of a technical field other than his/her major. Required Courses (12 units): select from BIOENGR C101, COM SCI 31 or COM SCI 32 or EL ENGR 10 (if additional two courses that are applied to technical breadth area are upper division), CH ENGR 102A (not open to students with MECH&AE 105A credit), C&EE 101 (not open to students with MECH&AE 101 (formerly 96) credit), C&EE 108 (not open to students with MECH&AE 101 (formerly 96) credit), EL ENGR 100 (not open to students with EL ENGR 10 or 110 credit), EL ENGR 101A (formerly 101), ENGR M101/MAT SCI M105, EL ENGR 102 (not open to students with MECH&AE 107 credit), EL ENGR 133A (not open for students with C&E 103 credit), MAT SCI 104, MECH&AE 101 (formerly 96) (not open to students with C&E 101 credit), MECH&AE 102 (not open to students with C&E 101 credit), MECH&AE 103, MECH&AE 105A (not open to students with CH ENGR 102 credit), MECH&AE 105D (not open to students with CH ENGR 101B credit). MECH&AE 105D is acceptable for aerospace engineering majors. SEE BOTTOM OF THIS PAGE FOR A SUMMARY OF ALL THE RESTRICTIONS

The Technical Breadth area in Nanotechnology is designed to train students with cutting-edge knowledge and skills for their future successes in nano-related fields. Required Upper Division Courses (12 units): ENGR M101/MAT SCI M105 (required), additional 8 units selected from BIOMED CM150/ EL ENGR CM150/MECH&AE CM180, ENGR M103/C&EE/M165, EL ENGR 128, (EL ENGR major students may take this course as long as they are NOT using the course to satisfy other degree requirements) MECH&AE M183B, MECH&AE C187L. SEE BOTTOM OF THIS PAGE FOR A SUMMARY OF ALL THE RESTRICTIONS

The Technical Breadth area in Pre-Med is designed for HSSEAS pre-med students. Required Courses (12 units): select from CHEM 30BL, CHEM 153A, LIFESC 3, LIFESC 4, LIFESC 7C, BIOSTATS 100A or STATS 100A.

The Technical Breadth area in Technology Management is designed to teach students how technology management works and what drives decision making in start-ups, in venture-backed IPOs and in giant multinationals. Required Courses (12 units): select from ENGR 110, ENGR 111, ENGR 112, ENGR 113, ENGR 180, MGMT 108, MGMT 160. MGMT 180 will be considered by petition filed at 6426BH. SEE BOTTOM OF THIS PAGE FOR A SUMMARY OF ALL THE RESTRICTIONS

The Technical Breadth area in Urban Planning is designed to provide students with the opportunity to gain working knowledge of community development, environmental planning, housing, land development, regional and international development, transportation, and urban design. Required (12 units): select courses from URBN PL 120, URBN PL 121, URBN PL 130, URBN PL CM137, URBN PL 141, URBN PL M150, URBN PL 151 and for enrollment in any of the following 200 level courses undergraduates need to petition, at 6426BH, and approval is subject to student meeting course requisites and having at minimum a 3.0 GPA: URBN PL M206A, URBN PL M250, URBN PL 251, URBN PL M253, URBN PL 254, URBN PL M255, URBN PL M256, URBN PL M258.

SUMMARY OF RESTRICTIONS

Item 1: It is not permitted to use more than one course from the same subset in meeting the degree requirements of any HSSEAS major unless an additional course from that subset is explicitly specified or is listed as a prerequisite in the catalog description of the course in the same subset. Example: in Subset 3b), MECH&AE 101 (formerly 96) is a pre-requisite for MECH&AE 102; therefore, a student is allowed take both of these courses unless this pre-requisite changes.

Item 2: A student who is taking a curriculum that requires a subset of courses from another department (different from the one from which the student’s degree is granted) may select three additional upper division courses for a TBA from that department to broaden his/her education in that area of study, as long as item 1 is satisfied. Example: computer science and engineering majors are required to some electrical engineering courses. Computer Science & Engineering majors may satisfy the technical breadth requirement by taking 3 more electrical engineering courses

Subset 1: Probability and Statistics course subset (C&EE 110, STATS 110A, EL ENGR 131A, MATH 170A, STATS 100A)
Subset 2: Numerical Computing course subset (EL ENGR 133A, C&EE 103, CH ENGR 109, MATH 151A)
Subset 3a): Structural Mechanics Subset (C&EE 108, MECH&AE 101 (formerly 96))
Subset 3b): Statics and Dynamics Subset (C&E 101, MECH&AE 101 (formerly 96), MECH&AE 102) see Item 1
Subset 4a): Introductory Thermodynamics subset (CH ENGR 102A, MECH&AE 105A)
Subset 4b): Transport Phenomena (CH ENGR 101B, MECH&AE 105D)
Subset 5a): Systems (EL ENGR 10, EL ENGR 100, PHYSICS 131)
Subset 5b): Controls (CH ENGR 107, EL ENGR 141, MECH&AE 171A)
Subset 6): Circuits (EL ENGR 10, EL ENGR 100, EL ENGR 110)
Subset 7): Differential Equations (MATH 33B, MECH&AE 82)