AREN Block Diagram – Students entering AREN program Fall 2018 through Spring 2020

Sem.	CR						
8 SPR	17	**Tech Elective-3**	**Free Elective-3**	**Tech Elective-3** From reverse	**AREN 4319-2 #** AREN Design 2 (AREN 4318, 4080)	**HSS Elective-3** Upper-division	**HSS Elective-3**
7 FALL	17	**Tech Elective-3**	**AREN 4570-3 #** Electrical Systems for Buildings (AREN 3040)	**Tech Elective-3** From reverse	**AREN 4318-3 #** AREN Design 1 (See notes****)	**AREN 4080-2 #** Arch. Design Studio 2 (AREN 3080)	**HSS Elective-3**
6 SPR	15		**AREN 3040-3 #** Electrical Circuits (APPM 2360, PHYS 1120)	**AREN 4110-3 #** HVAC Design (AREN 3010)	**CVEN 3256-3** Construction Equip. & Methods OR **AREN 4506-3** (CVEN 3246)	**Structural Design-3** CVEN 4545 or 4555** (CVEN 3525)	**ARCH 3214-3 #** History and Theory of Arch. 2
5 FALL	15		**AREN 4550-3 #** Illumination 2 (AREN 3540)	**AREN 3010-3 #** Energy Efficient Buildings (AREN 2050, 2110, 2120)	**CVEN 3246-3** Introduction to Construction (Junior standing)	**CVEN 3525-3** Structural Analysis (CVEN 3161)	**College-Appr. Writing Course-3*** **
4 SPR	16	**APPM 2360-4** Introduction to Linear Algebra & Diff. Equations (APPM 1360)	**AREN 3540-3 #** Illumination 1 (CSCI 1320, APPM 2350)	**AREN 2120-3 #** Fluid Mech. & Heat Transfer (AREN 2110, co-reqs. APPM 2350 and 2360)		**CVEN 3161-3** Mechanics of Materials I (CVEN 2121, co-req. APPM 2360)	**AREN 3080-3 #** OR **AREN 4830-3** Arch. Design Studio 1
3 FALL	17	**APPM 2350-4** Calculus III for Engineers (APPM 1360)	**PHYS 1120-4** Gen. Physics II (PHYS 1110, co-req. APPM 1360)	**AREN 2110-3** Thermodynamics (PHYS 1110, co-req. APPM 1360)	**AREN 2050-3 #** Building Materials and Systems (Soph. standing)	**CVEN 2121-3** Analytical Mechanics I (PHYS 1110, co-req. APPM 2350*)	
2 SPR	15	**APPM 1360-4** Calculus II for Engineers (APPM 1350)	**PHYS 1110-4** Gen. Physics I (co-req. APPM 1350)	**CSCI 1320-4†** Computer Sci. 1 (co-req. APPM 1350)		**GEEN 1400-3** Engrg. Projects OR **Basic Engineering Elective**	
1 FALL	16	**APPM 1350-4** Calculus I for Engineers (APPM 1235 or placement)	**CHEN 1211-4** Gen. Chem. for Engineers (1 yr. HS chem. or CHEM 1021)	**CHEM 1221-1** General Chemistry Lab for Engineers (co-req. CHEN 1211)	**AREN 1316-1 #** Introduction to Architectural Engineering	**AREN 1027-3** Engineering Drawing	**HSS Elective-3*** **

Course is offered only once per year (FALL or SPRING as shown) **Fall 2018/revised July 2022**

( ) Prerequisite and co-requisite requirements for course listed.

***** Co-requisite APPM 2350; OR co-requisite APPM 1360 and prerequisite GEEN 3830 Engineering Math.

****** CVEN 4545 Steel Design offered SPRING only; CVEN 4555 Reinforced Concrete Design offered FALL only.

******* College-approved writing courses: ENES/HUEN 1010 (first-year students only); or ENLP 3100, ENES/HUEN 3100, WRTG 3030, WRTG 3035, or PHYS 3050 (junior standing). AREN students are encouraged to take ENES/HUEN 1010 in their first year.

******** Prerequisites for AREN 4318: AREN 4110, AREN 4550, CVEN 3256 or AREN 4506, and CVEN 4545 or 4555. Co-requisites: AREN 4080 and 4570.

† Starting Fall 2019, CSCI 1320 is no longer available. Contact your academic advisor for alternatives.

AREN ELECTIVES AND OPPORTUNITIES FOR SPECIALIZATION

At least two technical electives must be selected from this list, from any emphasis area(s).
Some technical electives are offered intermittently, and are not guaranteed to be offered every year.
Graduate versions of combined courses (e.g. CVEN 5728 instead of CVEN 4728) are also accepted.

STRUCTURAL SYSTEMS

Strongly recommended:	**CVEN 4545 Steel Design*** (CVEN 3525) – spring
	CVEN 4555 Reinforced Concrete Design* (CVEN 3525) – fall
Recommended:	CVEN 4565 Design of Wood Structures (CVEN 3525) – spring every other year
	CVEN 4728 Foundation Engineering (CVEN 3718) – spring
Other options:	AREN 4315 Masonry Design (CVEN 3525) – spring every other year
	AREN 5660 Embodied Carbon in Buildings (instructor consent) – spring
	CVEN 4161 Mechanics of Materials II (CVEN 3161) – fall

MECHANICAL SYSTEMS

AREN 4010 Energy System Modeling & Control (AREN 4110) – fall, intermittent
AREN 4080 Computer Simulation of Building Systems (AREN 3010) – spring, intermittent
AREN 4025 Building Energy Audits (AREN 3010) – spring, intermittent
AREN 4890 Sustainable Building Design (AREN 3010) – fall, intermittent
AREN 4990 Computational Fluid Dynamics (CFD) Analysis (AREN 2120, APPM 2360) - intermittent

LIGHTING/ELECTRICAL SYSTEMS

Strongly recommended:	**AREN 4130 Optical Design** (AREN 3540) – fall
	AREN 4580 Daylighting (AREN 4130, 4550) – spring
	AREN 4620 Adaptive Lighting Systems (AREN 4550) – fall
Recommended:	AREN 4530 Advanced Lighting Design (AREN 4550) – spring
	AREN 4560 Luminous Radiative Transfer (AREN 3540) – spring

CONSTRUCTION ENGINEERING & MANAGEMENT

Strongly recommended:	**AREN 4506 Pre-Construction Estimating & Scheduling*** (CVEN 3246) – fall and spring
	AREN 4606 Construction Project Execution & Control (AREN 4506) – spring
	CVEN 3256 Construction Equipment & Methods* (CVEN 3246) – fall and spring
Other options:	AREN 4315 Masonry Design (CVEN 3525) – spring every other year
	CVEN 3708 Geotechnical Engineering 1 (CVEN 3161) – fall and spring
	CVEN 3718 Geotechnical Engineering 2 (CVEN 3708) – fall and spring
	CVEN 4565 Design of Wood Structures (CVEN 3525) – spring every other year

Note: Students are encouraged to consider CVEN 2012 Intro to Geomatics as a basic engineering or free elective.

Can only be counted as a technical elective if not used elsewhere toward degree requirements.

ELECTIVE REQUIREMENTS

Basic Engineering Elective – any 3-credit technical course given in the engineering college with a designator ASEN, AREN, APPM, CHEN, COEN, CVEN, CSCI, ECEN, EMEN, EVEN, GEEN, or MCEN, or other course approved by the CEAE Curriculum Committee. Remedial courses (precalculus, etc.) or courses approved as HSS electives may not be used.

Free Elective – Any college-level course, except: cannot be remedial courses needed to fulfill deficiencies (precalculus, introductory chemistry, etc.) and cannot be similar to other courses used toward graduation requirements (algebra-based physics, etc.).

Humanities and Social Science (HSS) Elective – See the College requirements and list of approved courses at www.colorado.edu/engineering/academics/policies/HSS.

Technical Elective – Generally, an upper-division (3000+) science or engineering course with technical content. All upper-division AREN/CVEN courses are technical electives; up to 6 credits outside of AREN/CVEN may be selected from the approved course list posted at https://www.colorado.edu/ceae/node/111/attachment. Up to 3 credits of independent study are allowed for technical elective credit.